Environment CANADA Environnement
10209261 VOL ISS 115 880600
EXC # 001
TD 171.5.C3 R46
REPORT EE

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A MANUAL OF ANALYTICAL METHODS FOR POLLUTANTS IN AIR, WATER AND SOIL

EE-115

89-05569/

A MANUAL OF ANALYTICAL METHODS FOR POLLUTANTS IN AIR, WATER AND SOIL

by

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EE-115

JUNE, 1988

ABSTRACT

This manual is a compilation of analytical chemical methods, from various literature sources, for the quantitative analysis of selected chemicals in various environmental media namely; air, water or soil . The chemicals chosen are from the Enviromental Emergencies Technology Division's Top 150 Priority Spill Compounds list. In this three volume set over 400 analytical methods are included. Volume 1 is a complete summary of Volumes 2 and 3. It contains the indices for all the methods and a short summary of each method including such information as; the procedure, the range and precision, and the source. Volume 2 contains 135 methods for the analysis of chemicals in air. Volume 3 contains 170 methods for the analysis of chemicals in water and 105 methods for the analysis of chemicals in soil. It also contains the methods included in the appendices.

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Air methods - (See last page of this document for explanation of abbreviations)

VOLUME 3

Water methods
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Analytical Methods of a General Nature methods (numbered with "G")
Appendix methods (numbered with "A")

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Acetic Acid (3)		1c
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Analyte: Acetic Acid (1)

Procedure: Adsorb on charcoal, desorb with formic acid, determine with GC/FID

Range: 12.5 - 50 mg/m^3

Precision: CV_T 5.8%

Source: NIOSH; Manual of Analytical Methods, Vol.4 (1978), S169.

Analyte: Acetic Acid (2)

Procedure: Collect on filter paper, desorb with NaOH, determine with HPLC

Range: MDQ 0.03 mg/charcoal tube

Precision: 1 - 3%

Source: Pauls, R.E., Weight, G.J.; "LC Determination of Acetic Acid Trapped in Charcoal Tubes", J. Chromatogr., 254 (1983), 171-7.

Analyte: Acetic Acid (3)

Procedure: Collect on filter paper, determine with ion chromatography

Range: Unknown

Precision: Unknown

Source: Dionex Corporation: Ion Chromatograph Systems, 1228 Titan Way, Sunnyvale, CA 94086.

Analyte: Acetic Anhydride

Procedure: Collect with bubbler, determine colorimetrically

Range: 9.35 - 37.4 mg/m^3

Precision: CV_T 6.0%

Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S170.

Analyte: Acetone

Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID

Range: 1200 - 4500 mg/m^3

Precision: CV_T 8.2%

Source: NIOSH; Manual of Analytical Methods, Vol.2 (1977), S1.

Analyte:	Acetylene
Procedure:	Determine with a two column-two detector GC/FID/TCD
Range:	Unknown
Precision:	RSD 0.10%
Source:	Poy, F., Cobelli, L.; "Determination of Permanent Gases and Light Hydrocarbons by Simultaneous Operation on Packed and Capillary Columns with Thermal Conductivity Detection and Flame Ionization Detection on a Single Computer Integrator", J. Chromatogr., 349 (1985) 17-22.

Analyte:	Acrylonitrile
Procedure:	Adsorb on Carbosieve B, desorb with methanol, determine with GC/FID
Range:	40 - 1100 mg/m^3
Precision:	CV_T 10%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 202.

Analyte:	Aluminum
Procedure:	Collect on filter, determine with atomic absorption
Range:	210 -2100 ug/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte:	Aminocarb
Procedure:	Collect on Tenax GC, desorb thermally, determine with GC/NPD
Range:	0.9 - 157 ng/tube
Precision:	Unknown
Source:	Krzymien, M.E.; "Measurement of Atmospheric Fenitrotion and Aminocarb Concentrations Near the Spray Area", Intern. J. Environ. Anal. Chem., 13 (1982), 64-89.

Analyte:	Ammonia (1)
Procedure:	Collect with impinger, determine colorimetrically
Range:	20 - 135 ppm
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 205.

Analyte:	Ammonia (2)
Procedure:	Collect on oxalic acid coated denuder tubes, extract with water, determine with ion chromatography
Range:	Unknown
Precision:	Unknown
Source:	Dionex Corporation: Ion Chromatographic Systems, 1228 Titan Way, Sunnyvale, CA 94086.

Analyte:	Arsine
Procedure:	Adsorption on charcoal, desorb with nitric acid, determine with flameless AA
Range:	0.094 - 0.404 mg/m^3
Precision:	CV_T 5.6%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S229.

Analyte:	Barium
Procedure:	Collect on filter, determine with atomic absorption
Range:	42 - 1050 ug/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte:	Benzene (1)
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	13 - 51.8 ppm
Precision:	CV_T 5.9%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S311.

Analyte:	Benzene (2)
Procedure:	Collect with impinger containing 1:2 HNO_3-H_2SO_4, reduce m-dinitrobenzene with Zn/HCl to m-phenylenediamine, then diazotize and couple with guaiacol and determine spectrophotometrically
Range:	0.4 - 2.4 ppm
Precision:	2%
Source:	Proc. -APCA Annual Meeting 1985, 78th (Vol. 6), 85-81.4, 10 pp..

Analyte:	Benzoic Acid
Procedure:	Collect on Teflon filters, determine with ion chromatography with UV detection
Range:	MDQ < 0.5 ug/m^3
Precision:	Unknown
Source:	Fung, Kochy, Grosjean and Daniel; "Determination of Particulate Atmospheric Benzoic Acid by Ion Chromatography with Ultraviolet Detection", Analytical Letters, 17(A6) (1984) 475-82.

Analyte:	Butadiene
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	1065 - 4590 mg/m^3
Precision:	CV_T 5.8%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S91.

Analyte:	1,3-Butadiene
Procedure:	Determine with a two column-two detector GC/FID/TCD
Range:	Unknown
Precision:	RSD 0.09%
Source:	Poy, F., Cobelli, L.; "Determination of Permanent Gases and Light Hydrocarbons by Simultaneous Operation on Packed and Capillary Columns with Thermal Conductivity Detection and Flame Ionization Detection on a Single Computer Integrator", J. Chromatogr., 349 (1985) 17-22.

Analyte:	Butanol
Procedure:	Adsorb on charcoal, desorb with eluent, determine with GC/FID
Range:	170 - 610 mg/m^3
Precision:	CV_T 6.5%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S66.

Analyte:	iso-Butanol
Procedure:	Adsorb on charcoal, desorb with eluent, determine with GC/FID
Range:	180 - 620 mg/m^3
Precision:	CV_T 7.3%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S64.

Analyte:	sec-Butanol
Procedure:	Adsorb on charcoal, desorb with eluent, determine with GC/FID
Range:	270 - 850 mg/m^3
Precision:	CV_T 6.6%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S53.

Analyte:	tert-Butanol
Procedure:	Adsorb on charcoal, desorb with eluent, determine with GC/FID
Range:	165 - 600 mg/m^3
Precision:	CV_T 7.5%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S63.

Analyte:	Butylenes
Procedure:	Determine with a two column-two detector GC/FID/TCD
Range:	Unknown
Precision:	RSD 0.10%
Source:	Poy, F., Cobelli, L.; "Determination of Permanent Gases and Light Hydrocarbons by Simultaneous Operation on Packed and Capillary Columns with Thermal Conductivity Detection and Flame Ionization Detection on a Single Computer Integrator", J. Chromatogr., 349 (1985) 17-22.

Analyte:	Calcium compounds
Procedure:	Collect with filter, digest with acid, determine with AA
Range:	2.6 - 10.16 mg/m^3 (for calcium oxide)
Precision:	CV_T 6.3% (for calcium oxide)
Source:	Identical to method for Calcium Oxide, NIOSH; Manual of Analytical Methods, Vol.3 (1977), S205.

Analyte:	Carbaryl
Procedure:	Collect on filters, determine colorimetrically
Range:	1.96 - 13.43 mg/m^3
Precision:	CV_T 5.7%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S273.

Analyte:	Carbofuran (1)
Procedure:	Adsorb on filter, desorb with acetone, determine with TLC
Range:	MDQ 0.1 ug/spot
Precision:	RSD 3%
Source:	Vukusic, I., Laskarin, B., "TLC Determination of Airborn Carbofuran and Quinalphos for Industrial Hygiene Purposes", Journal of HRC & CC, 4 (1981), 659-60.

Analyte:	Carbofuran (2)
Procedure:	Trap compound, desorb, add sodium hydroxide, sodium nitrite, p-nitroaniline and methanol to solution, determine colorimetrically
Range:	MDQ 2 ppm
Precision:	RSD 1%
Source:	Rajeswari, C.V.; "A Simple Colorimetric Method for Determination of Carbofuran and Bendiocarb in Formulations", Current Science, 53(15) (1984), 800-1.

Analyte:	Carbon Dioxide (1)
Procedure:	Collect in gas sampling bag, determine with GC/TCD
Range:	2270 - 10000 ppm
Precision:	CV_T 1.4%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S249.

Analyte: Carbon Dioxide (2)

Procedure: Determine with a two column-two detector GC/FID/TCD

Range: Unknown

Precision: RSD 0.5%

Source: Poy, F., Cobelli, L.; "Determination of Permanent Gases and Light Hydrocarbons by Simultaneous Operation on Packed and Capillary Columns with Thermal Conductivity Detection and Flame Ionization Detection on a Single Computer Integrator", J. Chromatogr., 349 (1985) 17-22.

Analyte: Carbon Disulfide (1)

Procedure: Add sample to pyrrolidine, add cupric sulfate, determine by the disappearance of Cu^{+2} with a copper electrode or by extracting the chelate formed into isoamyl acetae and determine with AA

Range: 5 - 100 mg/m^3

Precision: CV 4%

Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 179.

Analyte: Carbon Disulfide (2)

Procedure: Adsorb on charcoal, desorb with benzene, determine with GC/FPD

Range: 14.7 - 58.8 ppm

Precision: CV_T 5.9%

Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S248.

Analyte: Carbon Disulfide (3)

Procedure: Trap components and determine with a precolumn-equipped GC/PID/ECD/FID

Range: See method

Precision: Unknown

Source: Rudolph, J., Jebsen, C.; "The Use of Photoionization, Flameionization and Electron Capture Detectors in Series for the Determination of Low Molecular Weight Trace Components in the Non Urban Atmosphere", Intern. J. Environ. Analytical Chem., 13 (1983) 129-39.

Analyte:	Carbon Tetrachloride (1)
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	65 - 299 mg/m^3
Precision:	CV_T 9.2%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S314.

Analyte:	Carbon Tetrachloride (2)
Procedure:	Trap components and determine with a precolumn-equipped GC/PID/ECD/FID
Range:	See method
Precision:	Unknown
Source:	Rudolph, J., Jebsen, C.; "The Use of Photoionization, Flameionization and Electron Capture Detectors in Series for the Determination of Low Molecular Weight Trace Components in the Non Urban Atmosphere", Intern. J. Environ. Analytical Chem., 13 (1983) 129-39.

Analyte:	Chlordane
Procedure:	Collect on filter/sorbent, extract with toluene, determine with GC/ECD
Range:	0.156 - 1.17 mg/m^3
Precision:	CV_T 7.0%
Source:	NIOSH; Manual of Analytical Methods, Vol.6 (1980), S278.

Analyte:	Chloride
Procedure:	Collect with impinger, determine with ion specific electrode
Range:	0.1 - 1750 mg/m^3
Precision:	CV 2%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), 115.

Analyte: Chlorine

Procedure: Pass through fritted bubbler with methyl orange, determine colorimetrically

Range: 0.05 - 1.0 ppm

Precision: 5%

Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 209.

Analyte: Chloroform (1)

Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID

Range: 99.8 - 416 mg/m^3

Precision: CV_T 5.7%

Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S351.

Analyte: Chloroform (2)

Procedure: Trap components and determine with a precolumn-equipped GC/PID/ECD/FID

Range: See method

Precision: Unknown

Source: Rudolph, J., Jebsen, C.; "The Use of Photoionization, Flameionization and Electron Capture Detectors in Series for the Determination of Low Molecular Weight Trace Components in the Non Urban Atmosphere", Intern. J. Environ. Analytical Chem., 13 (1983) 129-39.

Analyte: Chromates

Procedure: Collect on filter, leach with dilute acid, determine colorimetrically the complexed Cr(VI)

Range: 0.052 - 0.204 mg/m^3

Precision: CV_T 8.4%

Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S317.

Analyte:	Copper
Procedure:	Collect on filter, determine with atomic absorption
Range:	21 - 210 ug/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte:	Cresols
Procedure:	Adsorb on silica gel, desorb with acetone, determine with GC/FID
Range:	10.54 - 42.2 mg/m^3
Precision:	CV_T 6.8%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S167.

Analyte:	Cyanide ion
Procedure:	Collect on filter and impinger, extract with sodium hydroxide, determine with ion specific electrode
Range:	2.6 - 9.7 mg/m^3
Precision:	CV_T 10.3%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S250.

Analyte:	Cyclohexane
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	510 - 2010 mg/m^3
Precision:	CV_T 6.6%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S28.

Analyte:	1,2-Dibromoethane
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	110 - 470 mg/m^3
Precision:	CV_T 7.7%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S104.

Analyte: ortho-Dichlorobenzene

Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID

Range: 150 - 629 mg/m^3

Precision: CV_T 6.7%

Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S135.

Analyte: para-Dichlorobenzene

Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID

Range: 183.2 - 777 mg/m^3

Precision: CV_T 5.2%

Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S281.

Analyte: Dichlorodifluoromethane (1)

Procedure: Adsorb on charcoal, desorb with dichloromethane, determine with GC/FID

Range: 2940 - 10500 mg/m^3

Precision: CV_T 6.4%

Source: NIOSH; Manual of Analytical Methods, Vol.2 (1977), S111.

Analyte: Dichlorodifluoromethane (2)

Procedure: Trap components and determine with a precolumn-equipped GC/PID/ECD/FID

Range: See method

Precision: Unknown

Source: Rudolph, J., Jebsen, C.; "The Use of Photoionization, Flameionization and Electron Capture Detectors in Series for the Determination of Low Molecular Weight Trace Components in the Non Urban Atmosphere", Intern. J. Environ. Analytical Chem., 13 (1983) 129-39.

Analyte:	1,2-Dichloroethane
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	195 - 819 mg/m^3
Precision:	CV_T 7.9%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S122.

Analyte:	Dichloromethane
Procedure:	Adsorb on activated carbon, desorb with methanol, determine with GC/FID
Range:	2 - 1600 mg/m^3
Precision:	CV_T 13%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 201.

Analyte:	Dichloromonofluoromethane
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	1730 - 7600 mg/m^3
Precision:	CV_T 6.1%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S109.

Analyte:	2,4-Dichlorophenoxyacetic Acid and Salts (1)
Procedure:	Collect on filter, extract with methanol, determine with HPLC
Range:	5.1 - 20.3 mg/m^3
Precision:	CV_T 5.1%
Source:	NIOSH; Manual of Analytical Methods, Vol.5 (1979), S279.

Analyte:	2,4-Dichlorophenoxyacetic Acid (2)
Procedure:	Collect with scrubber, determine with HPLC
Range:	MDQ 0.01 ug/l
Precision:	3.3%
Source:	Akerblom, M.; "Simple Precolumn Sample Enrichment in High-Performance Liquid Chromatography for Determination of Phenoxy Acid Herbicides in Water Samples from Exposure Studies", J. Chromatogr., 319 (1985), 427-31.

Analyte: Dimethylamine

Procedure: Adsorb on silica gel, desorb with H_2SO_4 in methanol, determine with GC/FID

Range: 7.02 - 29.5 mg/m^3

Precision: CV_T 6.2%

Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S142.

Analyte: Ethanol

Procedure: Adsorb on charcoal, desorb with eluent, determine with GC/FID

Range: 900 - 3300 mg/m^3

Precision: CV_T 6.5%

Source: NIOSH; Manual of Analytical Methods, Vol.2 (1977), S56.

Analyte: Ethylbenzene

Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID

Range: 222 - 884 mg/m^3

Precision: CV_T 4.1%

Source: NIOSH; Manual of Analytical Methods, Vol.2 (1977), S29.

Analyte: Ethylene (1)

Procedure: Trap on Porapak-S precolumn cooled with liqiud O_2, heat column to inject into GC/FID

Range: Unknown

Precision: Unknown

Source: DeGreef, J., DeProft, M., DeWinter, F.; "GC Determination of Ethylene in Large Air Volumes at the Fractional Parts-per-Billion Level", Anal. Chem. 48(1) (1976), 38-41.

Analyte: Ethylene (2)

Procedure: Inject a large volume of air into a GC/FID

Range: 10 - 10 000 mg/m^3

Precision: Unknown

Source: Environment Canada; Enviro TIPS (Technical Information on Problem Spills): Ethylene, 1984.

Analyte:	Ethylene Oxide
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	41 - 176 mg/m^3
Precision:	CV_T 10.3%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S286.

Analyte:	2-Ethylhexanol
Procedure:	Adsorb on Chromosorb 102, desorb with acetone, determine with GC/FID
Range:	Unknown
Precision:	Unknown
Source:	Russo, J., Shane, S.Q.H.; "Industrial Hygiene Personal Sampling of 2-Ethyl Hexanol and Determination by Flame Ionization Gas Chromatography", Anal. Chem., 55 (1983), 400-3.

Analyte:	Fenitrothion
Procedure:	Collect on Tenax GC, desorb thermally, determine with GC/NPD
Range:	Unknown
Precision:	Unknown
Source:	Krzymien, M.E.; "Measurement of Atmospheric Fenitrotion and Aminocarb Concentrations Near the Spray Area", Intern. J. Environ. Anal. Chem., 13 (1982), 64-89.

Analyte:	Formaldehyde (1)
Procedure:	Collect with alumina, elute with methanol-water, determine spectrophotometrically
Range:	0.4 - 52 mg/m^3
Precision:	CV_T 6%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 235.

Analyte: Formaldehyde (2)

Procedure: Collect with bubbler, derivatize with Girard T reagent, determine with polarography

Range: 1.4 - 6.2 ppm (8-hour T.W.A.)
4.6 - 19.8 ppm (Peak)

Precision: CV_T 5.2% (8-hour T.W.A.)
5.8% (Peak)

Source: NIOSH; Manual of Analytical Methods, Vol.4 (1978), S327.

Analyte: Formaldehyde (3)

Procedure: Collect on charcoal, desorb with H_2O_2, determine with ion chromatography

Range: Unknown

Precision: Unknown

Source: Kim, W.S., Geraci, C.L., Ruper, R.E.; "Sampling and Analysis of Formaldehyde in the Industrial Atmosphere", U.S. Dept. of Health, Education and Welfare, Cincinnati, Ohio 45226.

Analyte: Formic Acid (1)

Procedure: Collect with impinger, determine with GC/FID

Range: 3.8 - 75 mg/m^3

Precision: CV 11%

Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 232.

Analyte: Formic Acid (2)

Procedure: Adsorb on Chromosorb 103, desorb with deionized water, determine with ion chromatography/ electrolytic conductivity detection

Range: 4.4 - 21.6 mg/m^3

Precision: CV_T 7.3%

Source: NIOSH; Manual of Analytical Methods, Vol.5 (1979), S173.

Analyte:	Fluoride
Procedure:	Collect with impinger, determine with ion specific electrode
Range:	0.05 to 475 mg/m^3
Precision:	RSD 6.5%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 117.

Analyte:	Fluorotrichloromethane
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	2390 - 10500 mg/m^3
Precision:	CV_T 7.2%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S102.

Analyte:	Hexane
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	877 - 3679 mg/m^3
Precision:	CV_T 6.2%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S90.

Analyte:	Hydrazine (1)
Procedure:	Adsorb on sulfuric acid coated silica gel, elute with water, react with 2-furaldehyde, extract, determine with GC/FID
Range:	0.002 - 60 mg/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 248.

Analyte:	Hydrazine (2)
Procedure:	Collect on firebrick, desorb with sulfuric acid, determine colorimetrically
Range:	MDQ < 0.1 ppm
Precision:	Unknown
Source:	Suggs, H.J., Luskus, L.J., Kilian, H.J.; "A Field Procedure for Determining Low Concentrations of Hydrazine", USAF School of Aerospace Medicine, Brooks Air Force Base, Texas 78235, Report SAM-TR-79-28, 1978.

Analyte:	Hydrogen Chloride (1)
Procedure:	Collect with bubbler in sodium acetate, determine with ion specific electrode
Range:	3.5 - 14 mg/m^3
Precision:	CV_T 6.4%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S246.

Analyte:	Hydrogen Chloride (2)
Procedure:	Collect on silica gel, desorb with eluent, determine with ion chromatography
Range:	0.14 - 14 mg/m^3
Precision:	2.5%
Source:	NIOSH; Manual of Analytical Methods, Vol.5 (1979), 310.

Analyte:	Hydrogen Flouride
Procedure:	Collect with impinger, determine with ion specific electrode
Range:	0.05 to 475 mg/m^3
Precision:	RSD 6.5%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 117.

Analyte:	Hydrogen Peroxide (1)
Procedure:	Collect on coarse fritted bubbler with aqueous $TiSO_4$/ $(NH_4)_2SO_4$/ H_2SO_4 solution, adjust pH, react with quinolinol, determine colorimetrically
Range:	0 - 6 ug/ml
Precision:	Unknown
Source:	MOE; "Atmospheric Monitoring for Transportation Emergencies: Vol. III", (1981), Report ARB-032-81, Method 31A.

Analyte:	Hydrogen Peroxide (2)
Procedure:	Collect with impinger, react with luminol in the presence of Cu^{+2} catalyst, determine with autoanalyzer with photomultiplier tube at 450 nm
Range:	0.1 - 1 ppm
Precision:	SD 4%
Source:	MOE; "Atmospheric Monitoring for Transportation Emergencies: Vol. III", (1981), Report ARB-032-81, Method 31B.

Analyte:	Hydrogen Sulfide (1)
Procedure:	Absorb with impinger, determine spectrophotometrically
Range:	8.5 - 6.3 mg/m^3
Precision:	CV_T 12.1%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S4.

Analyte:	Hydrogen Sulfide (2)
Procedure:	Regulated air is passed through a humidifier and across lead acetate-treated paper, determine with a photocell measuring the resultant change in reflectance of the paper
Range:	1 - 3 000 ppb
Precision:	Unknown
Source:	ASTM; Annual Book of ASTM Standards, Part 11: Atmospheric Analysis, D4323-84, 1987.

Analyte:	Iron
Procedure:	Collect on filter, determine with atomic absorption
Range:	21 -210 ug/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte:	Lead
Procedure:	Collect on filter, determine with atomic absorption
Range:	42 - 840 ug/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte:	Magnesium
Procedure:	Collect on filter, determine with atomic absorption
Range:	2.1 - 21 ug/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte:	Malathion
Procedure:	Collect on filter, extract with iso-octane, determine with GC/FPD with phosphrous filter
Range:	8.0 - 35 mg/m^3
Precision:	CV_T 6.3%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S370.

Analyte:	Maleic Anhydride
Procedure:	Collect with bubbler, determine with HPLC
Range:	0.50 - 2.14 mg/m^3
Precision:	RSD 6.3%
Source:	NIOSH; Manual of Analytical Methods, Vol.5 (1979), 302.

Analyte:	MCPA
Procedure:	Collect with scrubber, determine with HPLC
Range:	MDQ 0.01 ug/l
Precision:	3.3%
Source:	Akerblom, M.; "Simple Precolumn Sample Enrichment in High-Performance Liquid Chromatography for Determination of Phenoxy Acid Herbicides in Water Samples from Exposure Studies", J. Chromatogr., 319 (1985), 427-31.

Analyte:	p,p-Diphenylmethane Diisocyanate (MDI)
Procedure:	Collect with impinger, add sodium nitrite, sulfamic acid, sodium carbonate and N-(1-Napthyl)-ethylenediamine dihydrochloride to solution, determine colorimetrically
Range:	0.007 - 0.073 ppm
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 142.

Analyte:	Mercury (1)
Procedure:	Adsorb on silvered Chromosorb P, thermal desorption, determine with flameless AA
Range:	0.046 - 0.18 mg/m^3
Precision:	CV_T 6.1%
Source:	NIOSH; Manual of Analytical Methods, Vol.4 (1978), S199.

Analyte:	Particulate Hg, Hg^o and organic Hg vapours (2)
Procedure:	Collect on three section solid sorbent, determine with flameless AA
Range:	0.001 - 2.0 ug/Tube
Precision:	7.3% (Vapour) 10.7% (Particulate) 7.4% (Alkyl)
Source:	NIOSH; Manual of Analytical Methods, Vol.5 (1979), 175.

Analyte:	Methanol
Procedure:	Adsorb on silica gel, desorb with water, determine with GC/FID
Range:	135 - 534 mg/m^3
Precision:	CV_T 6.5%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 247.

Analyte:	Methyl ethyl Ketone
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	380 - 1240 mg/m^3
Precision:	CV_T 7.2%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S3.

Analyte:	Methyl isobutyl Ketone
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	208 - 836 mg/m^3
Precision:	CV_T 6.4%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S18.

Analyte:	Methyl Methacrylate
Procedure:	Adsorb on XAD-2, desorb with carbon disulfide, determine with GC/FID
Range:	193 - 725 mg/m^3
Precision:	CV_T 6.3%
Source:	NIOSH; Manual of Analytical Methods, Vol.6 (1980), S43.

Analyte:	Methylamine
Procedure:	Adsorb on silica gel, desorb with deionized distilled water, determine with ion chromatography/electrolytic conductivity detector
Range:	6.24 - 28.1 mg/m^3
Precision:	CV_T 5.8%
Source:	NIOSH; Manual of Analytical Methods, Vol.6 (1980), S278.

Analyte:	Morpholine
Procedure:	Adsorb on silica gel, desorb with sulfuric acid, determine with GC/FID
Range:	28.5 - 108.4 mg/m^3
Precision:	CV_T 5.7%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S150.

Analyte:	Naptha
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	193 - 809 mg/m^3
Precision:	CV_T 5.1%
Source:	NIOSH; Manual of Analytical Methods, Vol.2 (1977), S86.

Analyte:	Nitric Acid
Procedure:	Collect with impinger, determine with ion specific electrode
Range:	2.60 - 10.8 mg/m^3
Precision:	CV_T 8.2%
Source:	NIOSH; Manual of Analytical Methods, Vol.4 (1977), S319.

Analyte:	Nitroglycerine
Procedure:	Adsorb on Tenax-GC, desorb with ethanol, determine with GC/ECD
Range:	0.1 - 100 mg/m^3
Precision:	CV_T 10%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 203.

Analyte:	Pentachlorophenol
Procedure:	Collect with filter and bubbler, extract with ethylene glycol, determine with HPLC
Range:	0.265 - 1.130 mg\m^3
Precision:	CV_T 7.2%
Source:	NIOSH; Manual of Analytical Methods, Vol.4 (1978), S297.

Analyte:	Phenol
Procedure:	Collect in bubbler through sodium hydroxide, acidify with sulfuric acid, determine with GC/FID
Range:	9.46 - 37.8 mg/m^3
Precision:	CV_T 6.8%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S330.

Analyte:	Phosphoric Acid (1)
Procedure:	Collect with filter, leach with water, complex formation, determine colorimetrically
Range:	0.47 - 1.93 mg/m^3
Precision:	CV_T 5.5%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S333.

Analyte:	Phosphoric Acid (2)
Procedure:	Collect on a membrane filter, determine spectrophotometrically
Range:	0.2 - 4.0 mg/m^3
Precision:	CV 4.3%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 216.

Analyte: Phosphorous (white)
Procedure: Adsorb on Tenax-GC, elute with xylene, determine with GC/FPD
Range: 0.01 - 1.00 mg/m^3
Precision: CV_T 6%
Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 257.

Analyte: Phosphorous (yellow, white)
Procedure: Collect with impinger, determine with GC/FPD
Range: 0.005 - 5.0 mg/m^3
Precision: RSD 3.3%
Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 242.

Analyte: Phosphorus (yellow)
Procedure: Collect on Tenax-GC, extract with xylene, determine with GC/FPD
Range: 0.056 - 0.244 mg/m^3
Precision: CV_T 9.0%
Source: NIOSH; Manual of Analytical Methods, Vol.4 (1978), S334.

Analyte: Phthalic Anhydride
Procedure: Collect on filter, extract and hydrolize with aqueous ammonia, determine with HPLC
Range: 5.5 - 28 mg/m^3
Precision: CV_T 8.9%
Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S179

Analyte: Polychlorinated Biphenyls (PCB) (1)
Procedure: Adsorb on Florisil, desorb with hexane, determine with GC/ECD
Range: 0.01 - 10 mg/m^3
Precision: RSD 4.4%
Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 244.

Analyte:	Polychlorinated Biphenyls (PCB) (2)
Procedure:	Adsorb on Forisil, desorb with hexane, perchlorinate, determine with GC/ECD
Range:	0.01 - 10 mg/m^3
Precision:	RSD 2.8%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 253.

Analyte:	Potassium
Procedure:	Collect on filter, determine with atomic absorption
Range:	4.2 - 84 ug/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte:	iso-Propylbenzene
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	120 - 480 mg/m^3
Precision:	CV_T 5.9%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S23.

Analyte:	Propylene
Procedure:	Trap components and determine with a precolumn-equipped GC/PID/ECD/FID
Range:	See method
Precision:	Unknown
Source:	Rudolph, J., Jebsen, C.; "The Use of Photoionization, Flameionization and Electron Capture Detectors in Series for the Determination of Low Molecular Weight Trace Components in the Non Urban Atmosphere", Intern. J. Environ. Analytical Chem., 13 (1983) 129-39.

Analyte: Propylene Oxide
Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range: 121 - 482 mg/m^3
Precision: CV_T 8.5%
Source: NIOSH; Manual of Analytical Methods, Vol.2 (1977), S75.

Analyte: Sodium
Procedure: Collect on filter, determine with atomic absorption
Range: 2.1 -42 mg/m^3
Precision: Unknown
Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte: Sodium Hydroxide
Procedure: Collect with bubbler, determine with electrometric titration
Range: 1 - 4 mg/m^3
Precision: CV_T 6%
Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 241.

Analyte: Styrene (1)
Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range: 426 - 1710 mg/m^3
Precision: CV_T 5.7%
Source: NIOSH; Manual of Analytical Methods, Vol.2 (1977), S30.

Analyte: Styrene (2)
Procedure: Collect in oxygen trap, extract with hexane, brominate in chloroform, determine with GC/ECD
Range: Unknown
Precision: Unknown
Source: Hoshika, Y.; "Gas Chromatographic Determination of Styrene as Its Dibromide", J. Chromatogr., 136(1) (1977), 95-103.

Analyte:	Sulfates, Sulfites and Sulfur Dioxide
Procedure:	Particulate sulfates and sulfites collected on filter; SO_2 on treated filter; analysis by ion chromatography
Range:	Sulfates and Sulfites: 0.1 - 10 mg/m^3 SO_2: 0.04 - 4 ppm
Precision:	5%
Source:	NIOSH; Manual of Analytical Methods, Vol.5 (1979), 268.

Analyte:	Sulfur Dioxide (1)
Procedure:	Collect with impinger, adsorb in peroxide, titrate with sodium hydroxide
Range:	0.01 - 10 ppm
Precision:	10%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 146.

Analyte:	Sulfur Dioxide (2)
Procedure:	Adsorb on molecular sieve 5A, thermal desorption, determine with mass spectrometry
Range:	2 - 625 mg/m^3
Precision:	CV_T 0.2%
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 204.

Analyte:	Sulfur Dioxide (3)
Procedure:	Collect with bubbler, titrate with barium perchlorate
Range:	6.6 - 26.8 mg/m^3
Precision:	CV_T 5.4%
Source:	NIOSH; Manual of Analytical Methods, Vol.4 (1977), S308.

Analyte:	Sulfur Dioxide (4)
Procedure:	Collect on impinger containing hydrogen peroxide, add thorin, titrate with barium perchlorate
Range:	0.1 - 5 mg/m^3
Precision:	5%
Source:	ASTM; Annual Book of ASTM Standards, Part 11: Atmospheric Analysis, D3449-79, 1987.

Analyte: Sulfuric Acid (1)
Procedure: Collect with impinger, determine with turbidimetry
Range: 0.1 - 4.0 mg/m^3
Precision: CV 9%
Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 187.

Analyte: Sulfuric Acid (2)
Procedure: Collect with filter, titrate with barium perchlorate
Range: 0.561 - 2.577 mg/m^3
Precision: CV_T 8.2%
Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S174.

Analyte: Sulfuric Acid (3)
Procedure: Collect on filter paper, compare color with standards
Range: 0.2 - 2 mg/m^3
Precision: RSD 8%
Source: NIOSH; Manual of Analytical Methods, Vol.5 (1979), 267.

Analyte: ortho-Terphenyl
Procedure: Adsorb on filter, desorb with carbon disulfide, determine with GC/FID
Range: 4.5 - 20 mg/m^3
Precision: CV_T 9.7%
Source: NIOSH; Manual of Analytical Methods, Vol.2 (1977), S27.

Analyte: Tetrachloroethylene
Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range: 655 - 2749 mg/m^3
Precision: CV_T 5.2%
Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S335.

Analyte: Tetraethyl Lead (as Pb)
Procedure: Adsorb on XAD-2, desorb with pentane, determine with GC/PID
Range: 0.045 - 0.20 mg/m^3
Precision: CV_T 8.7%
Source: NIOSH; Manual of Analytical Methods, Vol.4 (1978), S383.

Analyte: Titanium Dioxide
Procedure: Collect on filter, acid digestion, determine with atomic absorption
Range: 8.1 - 29.5 mg/m^3
Precision: CV_T 11.2%
Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S385.

Analyte: Toluene
Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range: 145.5 - 582 ppm
Precision: CV_T 5.2%
Source: NIOSH; Manual of Analytical Methods, Vol.3 (1977), S343.

Analyte: Toluene 2,4-Diisocyanate
Procedure: Collect and derivatize on coated glass wool, determine with HPLC
Range: 0.017 - 0.58 mg/m^3
Precision: CV_T 6%
Source: NIOSH; Manual of Analytical Methods, Vol.6 (1980), 326.

Analyte: 1,1,1-Trichloroethane (1)
Procedure: Adsorption on charcoal, desorption with carbon disulfide, determination with GC/FID
Range: See method
Precision: See method
Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 127.

Analyte: 1,1,1-Trichloroethane (2)

Procedure: Trap components and determine with a precolumn-equipped GC/PID/ECD/FID

Range: See method

Precision: Unknown

Source: Rudolph, J., Jebsen, C.; "The Use of Photoionization, Flameionization and Electron Capture Detectors in Series for the Determination of Low Molecular Weight Trace Components in the Non Urban Atmosphere", Intern. J. Environ. Analytical Chem., 13 (1983) 129-39.

Analyte: Turpentine

Procedure: Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID

Range: 264 - 1107 mg/m^3

Precision: CV_T 5.5%

Source: NIOSH; Manual of Analytical Methods, Vol.2 (1977), S88.

Analyte: Vinyl Acetate

Procedure: Adsorb on Chromosorb 107, thermal desorption, determine with GC/FID

Range: 8 - 210 mg/m^3

Precision: 8%

Source: NIOSH; Manual of Analytical Methods, Vol.4 (1978), 278.

Analyte: Vinyl Chloride

Procedure: Adsorb on activated carbon, desorb with carbon disulfide, determine with GC/FID

Range: 0.008 - 5.2 mg/m^3

Precision: CV_T 8%

Source: NIOSH; Manual of Analytical Methods, Vol.1 (1977), 178.

Analyte:	Xylene
Procedure:	Adsorb on charcoal, desorb with carbon disulfide, determine with GC/FID
Range:	218 - 870 mg/m^3
Precision:	CV_T 6.0%
Source:	NIOSH; Manual of Analytical Methods, Vol.3 (1977), S318.

Analyte:	Zinc
Procedure:	Collect on filter, determine with atomic absorption
Range:	4.2 - 42 ug/m^3
Precision:	Unknown
Source:	NIOSH; Manual of Analytical Methods, Vol.1 (1977), 173.

Analyte:	Zinc Oxide
Procedure:	Collect on filter, determine with x-ray diffraction analysis
Range:	2.4 - 9.9 mg/m^3
Precision:	CV_T 10.4%
Source:	NIOSH; Manual of Analytical Methods, Vol.4 (1978), S316.

Compound IN WATER	Method No.
Acetic Acid	1
Acetic Anhydride	1
Acetone (1)	3a
Acetone (2) *(and over 100 other volatile alcohols)	3b
Acrylonitrile (1)	5a
Acrylonitrile (2)	5b
Acrylonitrile (3)	3b
Adipic Acid	1
Aluminum (1) *(and 14 other metals)	7a
Aluminum (2) *(and 7 other metals)	7b
Aluminum (3)	7c
Aluminum (4)	S7d
Aminocarb	11
Ammonia (1)	12a
Ammonia (2)	12b
Arsenic (1)	17a
Arsenic (2)	17b
Barium (1)	7b
Barium (2)	18b
Benzene (1)	19a
Benzene (2)	19b
Benzene (3)	3b
Benzoic Acid	1
Boron (1)	7a
Boron (2)	21
n-Butanol (1)	24
n-Butanol (2)	3b
sec-Butanol	3b
iso- and n-Butyraldehyde	3a
n-Butyraldehyde	3b
Calcium (1) *(and 26 other metals)	27a
Calcium (2) *(and 31 other metals)	27b
Calcium (3)	S27c

Calcium Hydroxide and Oxide	33
Carbaryl (1)	36a
Carbaryl (2) *(and 22 other pesticides)	36b
Carbofuran (1)	36b
Carbofuran (2)	37a
Carbofuran (3)	37b
Carbonate	S38
Carbon Dioxide and Carbonate	38
Carbon Disulfide *(and other 5 nonhalogenated volatile organics)	39
Carbon Tetrachloride *(and 39 other halogenated volatile organics)	40
Chlordane *(and 193 other pesticides)	41
Chloride	42
Chlorine	43
Chlorobenzene (1)	40
Chlorobenzene (2)	19b
Chloroform	40
Copper (1)	7a
Copper (2)	27a
Copper (3)	S27b
Cresols *(and 16 other phenols)	48
Cresols--see also Phenols	
Cyclohexane *(and 15 other common pollutants of a petrochemical process stream)	50
Dicamba (1) *(and 9 other chlorinated herbicides)	52
Dichlorobenzenes (1)	40
Dichlorobenzenes (2)	19b
1,2-Dichloroethane	40
Dichloroethylene	3b
Dichloromethane *(and 30 other volatile organics)	56
2,4-Dichlorophenoxyacetic Acid (2,4-D) (1)	52
2,4-Dichlorophenoxyacetic Acid (2)	36b
Dinoseb	52
Ethanol (1)	24
Ethanol (2)	3b
Ethanolamine	64

Ethylbenzene (1)	19a
Ethylbenzene (2)	19b
Ethylene Glycol (1)	64
Ethylene Glycol (2)	3b
Ethylene Glycol (3)	66
Ethylene Oxide	3b
2-Ethylhexanol	3b
Fenitrothion (1)	68
Fenitrothion (2)	11
Flouride	72
Formic Acid	1
Hexane	3b
Hydrazine	75
Hydrochloric Acid	1
Hydrogen Peroxide (1)	78a
Hydrogen Peroxide (2)	78b
Iron (1)	7a
Iron (2)	27a
Lead (1)	7a
Lead (2)	27a
Magnesium (1)	27a
Magnesium (2)	27b
Magnesium (3)	S87
Malathion (1) *(and 13 other organophosphorous pesticides)	89a
Malathion (2)	89b
Maleic Anhydride	1
MCPA (2-Methyl-4-chlorophenoxyacetic Acid) (1)	52
MCPA (2) *(and 9 other acid herbicides)	91
Mercury (1)	7a
Mercury (2)	93
Methanol (1)	24
Methanol (2)	3b
Methylamine	94
Methyl ethyl Ketone (1)	3a
Methyl ethyl Ketone (2)	39

Methyl isobutyl Ketone (1)	3a
Methyl isobutyl Ketone (2)	39
Morpholine	99
Nitrate	101
Nitric Acid	1
Nitrilotriacetic Acid (1)	1
Nitrilotriacetic Acid (2)	103a
Nitrilotriacetic Acid (3)	103b
Nitrilotriacetic Acid (4)	103c
Nitroglycerine	104
Pentachlorophenol	106
Pentaerythritol	66
Phenols (1)	108a
Phenols (2)	108b
Phenols (3)	108c
Phosphate	109
Phosphoric Acid	1
Phosphorous (1)	27b
Phosphorous (2)	110a
Phosphorous (3)	110b
Polychlorinated Biphenyls (PCB) (1)	111a
*(and 63 other semivolatile organics)	
Polychlorinated Biphenyls (PCB) (2)	111b
*(and 20 other organochlorine pesticides)	
Potassium (1)	27a
Potassium (2)	27b
Potassium Hydroxide	33
iso-Propanol (1)	24
iso-Propanol (2)	3b
iso-Propylbenzene	19a
Propylene Glycol (1)	64
Propylene Glycol (2)	66
Propylene Oxide	3b
Sodium (1)	27a
Sodium (2)	27b

Sodium (3)	S121
Sodium Carbonate	33
Sodium Hydroxide	33
Styrene (1)	3b
Styrene (2)	50
Sulfate (1)	S138a
Sulfate (2)	S138b
Sulfur	27b
Sulfuric Acid	1
Tetrachloroethylene	40
Titanium (1)	7b
Titanium (2)	27b
Toluene (1)	19a
Toluene (2)	19b
Triallate (1) *(and 7 other herbicides)	150a
Triallate (2) *(and 6 other neutral herbicides)	150b
Triallate (3)	150c
Trichlorfon (1)	36b
Trichlorfon (2) *(and 29 other non-volatile hazardous organics)	152
1,1,1-Trichloroethane	40
Trichlorofluoromethane	40
Trifuralin (1)	150a
Trifuralin (2)	150b
Trinitrotoluene	154
Urea (1)	156
Urea (2)	66
Vinyl Acetate	3b
Vinyl Chloride	40
Xylenes (1)	19a
Xylenes (2)	19b
Zinc (1)	7a
Zinc (2)	27a
Zinc (3)	161a
Zinc (4)	S161b

Analyte:	Acetic Acid
Procedure:	Sodium hydroxide titration
Range:	0 - 10 000 mg/l
Precision:	10%
Source:	Hach Co.; Hach Water Analysis Handbook, 1981.

Analyte:	Acetic Anhydride
Procedure:	Sodium hydroxide titration
Range:	10 - 2000 mg/l
Precision:	10%
Source:	Smith, D.M., Bryant, W.M.D.; J. Am. Chem. Soc., 58 (1936), 2452.

Analyte:	Acetone (1)
Procedure:	Treat with 2,4-dinitrophenylhydrazine and potassium hydroxide, determine colorimetrically
Range:	0 - 400 mg/kg
Precision:	10%
Source:	Critchfield, F.E.; Organic Funtional Group Analysis, Permagon Press, New York, 1963.

Analyte:	Acetone (2)
Procedure:	Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range:	MDQ ~1 mg/l
Precision:	Unknown
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte:	Acrylonitrile (1)
Procedure:	Treat with morpholine, methyl cellosolve, acetic anhydride, and thymol blue/xylene cyanol FF, titrate with perchloric acid
Range:	100 - 2000 mg/l
Precision:	10%
Source:	Critchfield, F.E., Organic Funtional Group Analysis, Permagon Press, New York, 1963.

Analyte: Acrylonitrile (2)

Procedure: Determine with a purge-and-trap GC/FID

Range: MDQ 0.5 ug/l

Precision: SD 5.6%

Source: U.S.EPA/EMSL; Acrolein and Acrylonitrile - Method 603, 1985, NTIS # PB85-146629.

Analyte: Acrylonitrile (3)

Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.

Range: MDQ ~1 mg/l

Precision: Unknown

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Adipic Acid

Procedure: Sodium hydroxide titration

Range: 0 - 10 000 mg/l

Precision: 10%

Source: Hach Co.; Hach Water Analysis Handbook, 1981.

Analyte: Aluminum (1)

Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy

Range: 50 - 190 ug/l

Precision: See method

Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Aluminum (2)

Procedure: Determine by direct aspiration into a nitrous oxide-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA, Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 C.

Analyte: Aluminum (3)

Procedure: Add sulphuric acid, buffer, determine colorimetrically

Range: Unknown

Precision: RSD 30%

Source: AWWA, Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 306 B.

Analyte: Aluminum (4)

Procedure: Add buffer, xylenol orange, EDTA, determine colorimetrically

Range: 0 - 1 ug/ml

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 358.

Analyte: Aminocarb

Procedure: Extract with dichloromethane, determine with GC/NPD

Range: MDQ 0.1 ug/l

Precision: CV 11.7%

Source: Cassita, A., Mallet, V.N.; "Simultaneous GLC Determination of Fenitrothion, Aminocarb and Their Corresponding Hydrolysis Products in Water", Chromatographia, 18(6) (1984), 305-8.

Analyte: Ammonia (1)

Procedure:
A: Buffer at 9.5, distill into boric acid, determine N_2 colorimetrically, or determine by titrating to endpoint with sulfuric acid after adding methyl red
B: Add EDTA, mecurous iodide, potassium iodide, determine colorimetrically
C: Add magnesium sulfate, hypochlorous acid, phenol, determine colorimetrically
D: Adjust pH to alkaline, determine with ion-selective electrode /pH meter

Range:
A: Unknown
B: MDQ 5 ug/l
C: 0.01 - 2.0 mg/l
D: 0.5 - 1000 mg/l

Precision:
A: Colorimetric 3%, Acidimetric 11%
B: 4%
C: 10%
D: 5%

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 1426-79A, B, C, D.

Analyte: Ammonia (2)

Procedure: Determine by running sample with EDTA, phenate, sodium hypochlorite and sodium nitroprusside through an autoanalyzer equipped with a colorimeter

Range: Low: 0.001 - 0.200 mg/l
High: 0.05 - 2.00 mg/l

Precision: 0.02 mg/l

Source: "Ammonia in Waste and Wastewater", Technicon Industrial Method AAII 98-70W.

Analyte: Arsenic (1)

Procedure: A: Add hydrochloric acid, potassium iodide, stannous chloride to sample in arsine generator, prepare scrubber and absorber with silver diethyldithiocarbamate, add zinc to generator, determine arsine colorimetrically
B: Adjust pH, add sulfuric acid, nitric acid, cool, add hydrochloric acid, potassium iodide, stannous chloride to sample in arsine generator, or (add sodium borohydride), read maximum atomic absorbance value
C: Add nitric acid, nickel nitrate, determine with a graphite furnace AA

Range: A: 5 - 250 ug/l
B: 1 - 20 ug/l
C: 5 - 100 ug/l

Precision: A: 5%
B: 10%
C: 8%

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 2972-84A, B, C.

Analyte:	Arsenic (2)
Procedure:	Add sulfuric acid, nitric acid, boil, add perchloric acid, cool, determine using AA with a heated combustion tube with the sample being fed in by a proportioning pump along with hydrochloric acid and sodium borohydride
Range:	0.0002 - 0.0050 mg/l
Precision:	8.5%
Source:	Pierre, F.C., Lamoreux, T.C., et.al.; "An Automated Technique for the Sub-microgram Determination of Se and As in Surface Waters by Atomic Absorption Spectroscopy", Applied Spectroscopy, 30(1) (1976).

Analyte:	Barium (1)
Procedure:	Determine by direct aspiration into a nitrous oxide-acetylene flame of an atomic absorption (AA) spectrometer
Range:	Unknown
Precision:	Unknown
Source:	AWWA, Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 C.

Analyte:	Barium (2)
Procedure:	Add nitric acid, neutralize, add ammonium nitrate, heat, add potassium chromate, filter, determine colorimetrically
Range:	0 - 1 000 ug/cm^3
Precision:	Unknown
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 382.

Analyte:	Benzene (1)
Procedure:	Tetracyanoethylene colorimetric test
Range:	0 - 15 000 mg/l
Precision:	10%
Source:	Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte: Benzene (2)

Procedure: Determination with GC/PID with direct, purge and trap or headspace injection

Range: 0.5 - 9.7 ug/l

Precision: SD 10.0%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8020.

Analyte: Benzene (3)

Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.

Range: MDQ ~1 mg/l

Precision: Unknown

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Benzoic Acid

Procedure: Sodium hydroxide titration

Range: 0 - 10 000 mg/l

Precision: 10%

Source: Hach Co., Hach Water Analysis Handbook, 1981.

Analyte: Boron (1)

Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy

Range: 50 - 1000 ug/l

Precision: See method

Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Boron (2)

Procedure: A: Pass sample through acid column, add curcumin, evaporate off water, dissolve product in ethanol, determine colorimetrically
B: Adjust pH, evaporate water, add HCl, sulfuric acid, carmine, determine colorimetrically

Range: A: 0.1 - 1 mg/l
B: 1 - 10 mg/l

Precision: A: RSD 22.8%
B: RSD 35.5%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 404 A, B.

Analyte: n-Butanol (1)

Procedure: Treat with ceric ammonium nitrate, determine colorimetrically

Range: 200 - 8 000 mg/l

Precision: 10%

Source: Reid, V.W., Truelove, R.K.; "The Colorimetric Determination of Alcohols", The Analyst, 77 (1952), 325.

Analyte: n-Butanol (2)

Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.

Range: MDQ ~1 mg/l

Precision: Unknown

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, D 3695 - 82.

Analyte: sec-Butanol

Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.

Range: MDQ ~1 mg/l

Precision: Unknown

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, D 3695 - 82.

Analyte: iso- and n-Butyraldehyde

Procedure: Treat with 2,4-dinitrophenylhydrazine, potassium peroxide, pyridine, determine colorimetrically

Range: 0 - 40 mg/l

Precision: 10%

Source: Critchfield, F.E.; Organic Funtional Group Analysis, Permagon Press, New York, 1963.

Analyte: n-Butyraldehyde

Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.

Range: MDQ ~1 mg/l

Precision: Unknown

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, D 3695 - 82.

Analyte: Calcium (1)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Calcium (2)

Procedure: Acidify, concentrate, determine with ICP AE

Range: MDQ 5 ug/l

Precision: Unknown

Source: Thompson, M., et al.; "Water Analysis by Inductively Coupled Plasma Atomic-emission Spectrometry after a Rapid Pre-concentration", Analyst, 107 (1982), 1330-4.

Analyte: Calcium (3)

Procedure: II: Add potassium cyanide, hydroxylamine hydrochloride, triethanolamine, sodium hydroxide, Calcon to soil extract, titrate with EDTA
III: Add methanol, buffer to soil extract, adjust pH, add reagent solution, determine colorimetrically

Range: Unknown

Precision: II: Unknown
III: RSD 0.6%

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 120-3.

Analyte: Calcium Hydroxide and Oxide

Procedure: Add phenolphthalein, titrate with sulfuric acid

Range: 0 - 10 000 mg/l

Precision: 10%

Source: Hach Co., Hach Water Analysis Handbook, 1981.

Analyte: Carbaryl (1)

Procedure: Extract with dichloromethane, pass through resin column, prepare heptaflourobutyryl derivatives, determine with GC/ECD

Range: 2.5 - 10 ppb

Precision: Unknown

Source: Nagasawa, K., et. al.; "Gas Chromatographic Determination of Microamounts of Carbaryl and 1-Napthol in Natural Water as Sources of Water Supplies", J. Chromatogr., 144(1) (1977), 77-84.

Analyte: Carbaryl (2)

Procedure: Extract into hexane or benzene, determine with plasma chromatography

Range: 0.1 ng/ sample

Precision: Unknown

Source: Moye, H.A.; "Plasma Chromatography of Pesticides", J. Chromatogr. Sci., 13(6) (1975), 285-90.

Analyte: Carbofuran (1)

Procedure: Extract into hexane or benzene, determine with plasma chromatography

Range: ~ 0.1 ng/ sample

Precision: Unknown

Source: Moye, H.A.; "Plasma Chromatography of Pesticides", J. Chromatogr. Sci., 13(6) (1975), 285-90.

Analyte: Carbofuran (2)

Procedure: Add sodium hydroxide, p-aminobenzoic acid, determine colorimetrically

Range: 0.3 - 1.5 ppm

Precision: Unknown

Source: Rajeswari, C.V., Naidu, P.R.; "A New Colorimetric Method for the Determination of Carbofuran, Bendiocarb and Carbosulfan", J. Food Sci. Tech., 23 (1986), 101-3.

Analyte: Carbofuran (3)

Procedure: Concentration and determination with HPLC/UV or GC/TSD

Range: MDQ 1 ppb

Precision: Unknown

Source: Cramer, P.H., Carey, A.E.; "Determination of Carbofuran and its Metabolites by High-Performace Liquid Chromatography using On-Line Trace Enrichment", J. Chromatogr., 235 (1982) 489-500.

Analyte: Carbonate

Procedure: Add phenolpthalein to soil extract, titrate with sulphuric acid, add methyl orange, titrate again with sulphuric acid.

Range: Unknown

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 83.

Analyte:	Carbon Dioxide and Carbonate
Procedure:	A: Adjust pH, heat, add phenolphthalien, barium hydroxide, sulfuric acid, and boiled sample to flask, titrate to endpoint with HCl B: Add sodium hydroxide and strontium, neutralize, aerate to remove CO_2 in the presence of excess acid, determine by back-titration of acid C: Determine CO_2 from measurements of pH and bicarbonate ion E: Add sodium hydroxide, determine electrometrically
Range:	A: 1 - 50 mg/l B: Unknown C: Unknown E: Unknown
Precision:	A: 1% B: Unknown C: 1% E: 10%
Source:	ASTM; Annual Book of ASTM Standards, 1977, Method D 513-71A, B, C, E.

Analyte:	Carbon Disulfide
Procedure:	GC/FID determination using direct, purge and trap or headspace injection
Range:	Unknown
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8015.

Analyte:	Carbon Tetrachloride
Procedure:	GC/ECD determination using direct, purge and trap or headspace injection
Range:	0.55 - 50 ug/l
Precision:	SD 25.6%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Chlordane

Procedure: Determine with GC/ECD/NPD

Range: Unknown

Precision: Unknown

Source: Ripley, B.D., Braun, H.E.; "Retention Time Data for Organochlorine, Organophosphorous, and Organonitrogen Pesticides on SE-30 Capillary Column and Application of Capillary Gas Chromatography to Pesticide Residue Analysis", J. Assoc. Off. Anal. Chem., 66(5) (1983), 1084-95.

Analyte: Chloride

Procedure:
A: Adjust pH, add diphenylcarbazone-bromophenol blue, titrate with silver nitrate
B: Adjust pH, add potassium chromate, titrate with silver nitrate
C: Add ferrous ammonium sulfate, mercuric thiocyanate, determine colorimetrically
D: Add chloride ion strength adjustor, determine with chloride ion-selective electrode

Range:
A: Unknown
B: > 5 ug/l
C: 0.1 - 10 mg/l
D: > 1 g/l

Precision:
A: 2%
B: 1%
C: 5%
D: Unknown

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 512-81A, B, C, D.

Analyte: Chlorine

Procedure:
A: Adjust pH, add potassium iodide, titrate with sodium thiosulfate
B: Free available chlorine- Adjust pH, reduce chlorine with phenylarsine oxide, detect with microammeter
Combined available chlorine- Adjust pH, add potassium iodide, titrate with phenylarsine oxide, this can be further treated to obtain amounts of monochloroamine and dichloroamine
C: Adjust pH, titrate with phenylarsine oxide, determine amperometrically
D: Adjust pH, add buffer, N,N-diethyl-p-phenylene diamine, titrate with ferrous ammonium sulfate
E: Add buffer, N,N-diethyl-p-phenylene diamine, determine colorimetrically
F: Add buffer, leuco crystal violet indicator, determine colorimetrically

Range: A: MDQ 1 mg/l
B: 0.1 - 2.0 mg/l
C: > 2 mg/l
D: > 18 ug/l
E: > 18 ug/l
F: MDQ 10 ug/l

Precision: A: Unknown
B: SD 42.3%
C: 25%
D: 8%
E: 16%
F: 7%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 408 A, B, C, D, E, F.

Analyte: Chlorobenzene (1)

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: 2.21 - 50 ug/l

Precision: SD 8.9%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Chlorobenzene (2)

Procedure: Determination with GC/PID with direct, purge and trap or headspace injection

Range: 0.5 - 100 ug/l

Precision: SD 9.4%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8020.

Analyte: Chloroform

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: 0.44 - 50 ug/l

Precision: SD 20.6%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte:	Copper (1)
Procedure:	Determination with d-c argon plasma atomic emission (AE) spectroscopy
Range:	50 - 1000 ug/l
Precision:	See method
Source:	ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte:	Copper (2)
Procedure:	Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer
Range:	Unknown
Precision:	Unknown
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte:	Copper (3)
Procedure:	Adjust pH, add bromthymol blue, acidify, titrate with ammonium hydroxide
Range:	Unknown
Precision:	Unknown
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 399.

Analyte:	Cresols
Procedure:	Determination with GC/FID or derivitization and determination with GC/ECD
Range:	Unknown
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8040.

Analyte:	Cyclohexane
Procedure:	Extract with ether, determine with GC/FID
Range:	Unknown
Precision:	Unknown
Source:	Clements, L.D., Shang-ta, W.C.; "Charachterization of Hydrocarbon Pollutant Burdens in Petrochemical and Refinery Process Streams", Environ. Inter., 7 (1982), 259-65.

Analyte:	Dicamba
Procedure:	Esterification and GC/ECD determination
Range:	MDQ 1.0 ug/l
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8150.

Analyte:	Dichlorobenzenes (1)
Procedure:	GC/ECD determination using direct, purge and trap or headspace injection
Range:	3 - 50 ug/l
Precision:	SD 9%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte:	Dichlorobenzenes (2)
Procedure:	Determination with GC/PID with direct, purge and trap or headspace injection
Range:	0.5 - 5.0 ug/l
Precision:	SD 25%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8020.

Analyte:	1,2-Dichloroethane
Procedure:	GC/ECD determination using direct, purge and trap or headspace injection
Range:	0.44 - 46.7 ug/l
Precision:	SD 4.8%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte:	Dichloroethylene
Procedure:	Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range:	MDQ ~1 mg/l
Precision:	Unknown
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte:	Dichloromethane
Procedure:	GC/MS determination
Range:	MDQ 2.8 ug/l
Precision:	SD 28%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8240.

Analyte:	2,4-Dichloropnenoxyacetic Acid (2,4-D) (1)
Procedure:	Esterification and GC/ECD determination
Range:	MDQ 1.0 ug/l
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8150.

Analyte:	2,4-Dichlorophenoxyacetic Acid (2)
Procedure:	Extract into hexane or benzene, determine with plasma chromatography
Range:	~ 0.1 ng/ sample
Precision:	Unknown
Source:	Moye, H.A.; "Plasma Chromatography of Pesticides", J. Chromatogr. Sci., 13(6) (1975), 285-90.

Analyte:	Dinoseb
Procedure:	Esterification and GC/ECD determination
Range:	MDQ 0.1 ug/l
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8150.

Analyte:	Ethanol (1)
Procedure:	Add ceric ammonium nitrate, determine colorimetrically
Range:	200 - 10 000 mg/kg
Precision:	10%
Source:	Reid, V.W., Truelove, R.K.; "The Colorimetric Determination of Alcohols", The Analyst, 77 (1952), 325.

Analyte:	Ethanol (2)
Procedure:	Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range:	MDQ ~1 mg/l
Precision:	Unknown
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Ethanolamine

Procedure: Add periodic acid, sodium bicarbonate, arsenious acid, starch indicator, titrate with iodine

Range: 0 - 500 mg/l

Precision: 10%

Source: Lehman, A.J., Newman, H.W.; J. Pharmacol. Exptl. Therap., 60 (1937), 312.

Analyte: Ethylbenzene (1)

Procedure: Add tetracyanoethylene, determine colorimetrically

Range: 0 - 750 mg/kg

Precision: 10%

Source: Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte: Ethylbenzene (2)

Procedure: Determination with GC/PID with direct, purge and trap or headspace injection

Range: 0.5 - 9.9 ug/l

Precision: SD 12.4%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8020.

Analyte: Ethylene Glycol (1)

Procedure: Add periodic acid, sodium bicarbonate, arsenious acid, starch indicator, titrate with iodine

Range: 0 - 500 mg/l

Precision: 10%

Source: Lehman, A.J., Newman, H.W.; J. Pharmacol. Exptl. Therap., 60 (1937), 312.

Analyte:	Ethylene Glycol (2)
Procedure:	Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range:	MDQ ~1 mg/l
Precision:	Unknown
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte:	Ethylene Glycol (3)
Procedure:	Determine with HPLC
Range:	MDQ 5 ug/l
Precision:	Unknown
Source:	Baust, J.G., et al.; "Comparative Separation of Low-Molecular-Weight Carbohydrates and Polyols by High-Performance Liquid Chromatography: Radially Compressed Amine Modified Silica versus Ion Exchange", J. of Chromatography, 261 (1983), 65-75.

Analyte:	Ethylene Oxide
Procedure:	Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range:	MDQ ~1 mg/l
Precision:	Unknown
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte:	2-Ethylhexanol
Procedure:	Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range:	MDQ ~1 mg/l
Precision:	Unknown
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Fenitrothion (1)

Procedure: Extract with hexane, determine with GC/FID

Range: MDQ 0.05 ug/l

Precision: Unknown

Source: Yule, W.N., Duffy, J.R.; Bull. Environ. Contam. Toxicol., 8 (1972), 10-7.

Analyte: Fenitrothion (2)

Procedure: Extract with dichloromethane, determine with GC/NPD

Range: MDQ 0.01 ug/l

Precision: CV 4%

Source: Cassita, A., Mallet, V.N.; "Simultaneous GLC Determination of Fenitrothion, Aminocarb and Their Corresponding Hydrolysis Products in Water", Chromatographia, 18(6) (1984), 305-8.

Analyte: Flouride

Procedure: A: Distill from sulfuric acid, add acid zirconyl-SPADNS reagent, determine colorimetrically
B: Determine using ion-specific electrode

Range: A: 0 - 1.40 mg/l
B: 0.1 - 1000 mg/l

Precision: A: 8.9%
B: 3.0%

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 1179-80A, B.

Analyte: Formic Acid

Procedure: Add phenolphthalein, titrate with sodium hydroxide

Range: 0 - 10 000 mg/l

Precision: 10%

Source: Hach Co., Hach Water Analysis Handbook, 1981.

Analyte: Hexane

Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.

Range: MDQ ~1 mg/l

Precision: Unknown

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Hydrazine

Procedure: Add p-dimethylaminobenzaldehyde, determine colorimetrically

Range: 5 - 200 ug/l

Precision: 3%

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 1385-86.

Analyte: Hydrochloric Acid

Procedure: Add phenolphthalein, titrate with sodium hydroxide

Range: 0 - 10 000 mg/l

Precision: 10%

Source: Hach Co., Hach Water Analysis Handbook, 1981.

Analyte: Hydrogen Peroxide (1)

Procedure: Add ferrous sulfate, buffer, determine colorimetrically

Range: 0 - 10 mg/l

Precision: 10%

Source: Feigel, F.; Spot Tests in Organic Analysis, Elesevier Publishing, 1966.

Analyte: Hydrogen Peroxide (2)

Procedure: Add potassium iodide, titrate with sodium thiosulfate

Range: 0 - 75 mg/l

Precision: 10%

Source: Treadwell, J., Hall, K.; Analytical Chemistry, Vol II, Quantitative Analysis, 8th Ed. (1935).

Analyte: Iron (1)

Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy

Range: 50 - 1000 ug/l

Precision: See method

Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Iron (2)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Lead (1)

Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy

Range: 200 - 1000 ug/l

Precision: See method

Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Lead (2)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte:	Magnesium (1)
Procedure:	Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer
Range:	Unknown
Precision:	Unknown
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte:	Magnesium (2)
Procedure:	Acidify, concentrate, determine with ICP AE
Range:	MDQ 10 ug/l
Precision:	Unknown
Source:	Thompson, M., et al.; "Water Analysis by Inductively Coupled Plasma Atomic-emission Spectrometry after a Rapid Pre-concentration", Analyst, 107 (1982), 1330-4.

Analyte:	Magnesium (3)
Procedure:	III. Add polyvinyl alcohol, sodium hydrogen sulphite, thiazole yellow, sodium hyroxide to soil extract, determine colorimetrically IV. Evaporate aqueous sample dry, add nitric acid, centrifuge, add sulphuric acid, ethanol, centrifuge, decant liquid, add buffer, potassium cyanide, hydroxylamine, Eriochrome Black T and titrate with EDTA
Range:	< 3 ug/ml and Unknown
Precision:	Unknown
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 125, 123.

Analyte:	Malathion (1)
Procedure:	Esterification and determination with GC/electrolytic conductivity detection
Range:	Unknown
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8140.

Analyte: Malathion (2)

Procedure: Trap on activated charcoal, add ethanol, potassium hydroxide, acetic anhydride, heat, determine colorimetrically

Range: MDQ 1 mg/l

Precision: Unknown

Source: Sharma, S.R., et al.; "A New Specific Spot Test for the Detection of Malathion in Water", Water Res., 17(4), 471-3.

Analyte: Maleic Anhydride

Procedure: Add phenolphthalein, titrate with sodium hydroxide

Range: 25 - 1 000 mg/l

Precision: 10%

Source: Smith, D.M., Bryant, W.M.D.; J. Am. Chem. Soc., 58 (1936), 2452.

Analyte: MCPA (2-Methyl-4-chlorophenoxyacetic Acid) (1)

Procedure: Esterification and GC/ECD determination

Range: MDQ 200 ug/l

Precision: Unknown

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8150.

Analyte: MCPA (2)

Procedure: Esterify and determine with GC/ECD

Range: MDQ 1 ug/l

Precision: Unknown

Source: Lee, H-B., et al.; "Chemical Derivitization Analysis of Pesticide Residues. X. Analysis of Ten Acid Herbicides in Natural Waters", J. Assoc. Off. Anal. Chem., 69(3) (1986), 557-60.

Analyte:	Mercury (1)
Procedure:	Determination with d-c argon plasma atomic emission (AE) spectroscopy
Range:	200 - 1000 ug/l
Precision:	See method
Source:	ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte:	Mercury (2)
Procedure:	Add potassium permanganate, sufuric acid, boil, add dithizone, hydroxylamine hydrochloride, extract, determine colorimetrically
Range:	0.2 - 10 ug/l
Precision:	5%
Source:	ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 3223-86.

Analyte:	Methanol (1)
Procedure:	Add ceric ammonium nitrate, determine colorimetrically
Range:	500 - 10 000 mg/l
Precision:	10%
Source:	Reid, V.W., Truelove, R.K.; "The Colorimetric Determination of Alcohols", The Analyst, 77 (1952), 325.

Analyte:	Methanol (2)
Procedure:	Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range:	MDQ ~1 mg/l
Precision:	Unknown
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Methylamine

Procedure: Derivitize with pentafluorobenzaldehyde, extract into hexane, determine with GC/MS

Range: Unknown

Precision: Unknown

Source: Avery, M.J., Junk, G.A.; "Gas Chromatography/Mass Spectrometry Determination of Water-Soluble Primary Amines as Their Pentafluorobenzaldehyde Imines", Anal. Chem., 57 (1985), 790-2.

Analyte: Methyl ethyl Ketone (1)

Procedure: Add 2,4-dinitrophenylhydrazine, potassium hydroxide, pyridine, determine colorimetrically

Range: 0 - 400 mg/l

Precision: 10%

Source: Critchfield, F.E., Organic Functional Group Analysis, Permagon Press, New York, 1963.

Analyte: Methyl ethyl Ketone (2)

Procedure: GC/FID determination using direct, purge and trap or headspace injection

Range: Unknown

Precision: Unknown

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8015.

Analyte: Methyl isobutyl Ketone (1)

Procedure: Add 2,4-dinitrophenylhydrazine, potassium hydroxide, pyridine, determine colorimetrically

Range: 0 - 400 mg/l

Precision: 10%

Source: Critchfield, F.E.; Organic Funtional Group Analysis, Permagon Press, New York, 1963.

Analyte:	Methyl isobutyl Ketone (2)
Procedure:	GC/FID determination using direct, purge and trap or headspace injection
Range:	Unknown
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8015.

Analyte:	Morpholine
Procedure:	Add acrylonitrile, methanol, methyl cellosolve, acetic anhydride, thymol blue/xylene cyanol FF, titrate with perchloric acid
Range:	100 - 2 000 mg/kg
Precision:	10%
Source:	Critchfield, F.E.; Organic Functional Group Analysis, Pergamon Press, New York, 1963.

Analyte:	Nitrate
Procedure:	A: UV analysis (Screening test only) B: Determine with nitrate sensitive electrode C: Cadmium-copper reduction of nitrate to nitrite, diazotization with sulfanilic acid, coupling with N-(1-naphthyl)-ethylenediamine, determine colorimetrically
Range:	A: Unknown B: 0.14 - 1400 mg/l C: 0.010 - 1.00 mg/l
Precision:	A: Unknown B: Unknown C: 3.2%
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 418 A,B,C.

Analyte:	Nitric Acid
Procedure:	Add phenolphthalein, titrate with sodium hydroxide
Range:	0 - 10 000 mg/l
Precision:	10%
Source:	Hach Co., Hach Water Analysis Handbook, 1981.

Analyte:	Nitrilotriacetic Acid (1)
Procedure:	Add phenolphthalein, titrate with sodium hydroxide
Range:	40 - 1500 mg/l
Precision:	10%
Source:	Smith, D.M., Bryant, W.M.D.; J. Am. Chem. Soc., 58 (1936), 2452.

Analyte:	Nitrilotriacetic Acid (2)
Procedure:	Add ion-exchange resin to sample, agitate, filter, add aliquot to zinc-zincon mixture, determine colorimetrically
Range:	0.5 - 10.0 mg/l
Precision:	15%
Source:	Kopp, J.F., McKee, G.D.; "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020.

Analyte:	Nitrilotriacetic Acid (3)
Procedure:	Clean-up with anion exhange resin, derivatize with butanol-HCl, determine with GC/FID
Range:	1 - 10 000 ppb
Precision:	Unknown
Source:	Aue, W.A., et al.; "The Determination of Part-Per-Billion Levels of Citric Acid and Nitrilotriacetic Acid in Tap Water and Sewage Effluents", J. Chromatogr., 72 (1972), 259-67.

Analyte:	Nitrilotriacetic Acid (4)
Procedure:	Adjust pH, add bismuth, determine with differential pulse anodic stripping voltammetry
Range:	MDQ 0.2 ug/l
Precision:	RSD 1.3%
Source:	Voulgarpoulos, A., et al.; "Indirect Trace Determination of NTA in Natural Waters by Differential Pulse Anodic Stripping Voltametry", Fres. Z. Anal. Chem., 317 (1984), 367-71.

Analyte:	Nitroglycerine
Procedure:	Determine with HPLC
Range:	1 - 50 ug/l
Precision:	RSD 1%
Source:	Severin, G.; "Rapid High-Performance Liquid Chromatographic Procedure for Nitroglycerine and Its Degradation Products", J. Chromatogr. 320 (1985), 445-9.

Analyte:	Pentachlorophenol
Procedure:	Adjust pH, extract with hexane, acidify aqueous phase, extract with benzene, concentrate, dilute with ethyl ether, methylate with ethereal diazomethane, replace benzene for ethyl ether, determination with GC/ECD
Range:	MDQ 0.01 ug/l
Precision:	Unknown
Source:	L. Rudling; Water Research, 4 (1970), P533-37.

Analyte:	Pentaerythritol
Procedure:	Determine with HPLC
Range:	MDQ 5 ug/l
Precision:	Unknown
Source:	Baust, J.G., et al.; "Comparative Separation of Low-Molecular-Weight Carbohydrates and Polyols by High-Performance Liquid Chromatography: Radially Compressed Amine Modified Silica versus Ion Exchange", J. of Chromatography, 261 (1983), 65-75.

Analyte:	Phenols (1)
Procedure:	B: Distill sample, react with 4-aminoantipyrine and potassium ferricyanide, extract with chloroform, determine colorimetrically C: Add ammonium hydroxide, buffer, 4-aminoantipyrine, potassium ferricyanide, determine colorimetrically D: Determine by direct aqueous injection into GC/ECD
Range:	B: 0.015 - 0.150 mg/l C: MDQ > 100 ug/l D: Unknown
Precision:	Unknown
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 510 B, C, D.

Analyte: Phenols (2)

Procedure: Determination with GC/FID

Range: MDQ 1 mg/l

Precision: 10%

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1983, Method D 2580 - 83.

Analyte: Phenols (3)

Procedure: Add sodium bicarbonate, acetic acid to make phenolic acetate esters, determine with GC/FID

Range: 0.08 - 0.24 umoles/l

Precision: Unknown

Source: Coutts, R.T., et. al.; "Gas Chromatographic Analysis of Trace Phenols by Direct Acetylation in Aqueous Solution", J. Chromatogr., 179 (1979), 291-9.

Analyte: Phosphate

Procedure: Add molybdate, reduce with ascorbic acid, determine colorimetrically

Range: 0.0050 - 0.10 mg/l

Precision: 1.9%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 424 F.

Analyte: Phosphoric Acid

Procedure: Add phenolphthalien, titrate with sodium hydroxide

Range: 0 - 10 000 mg/l

Precision: 10%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 12th Ed. (1965).

Analyte: Phosphorous (1)

Procedure: Acidify, concentrate, determine with ICP AE

Range: MDQ 2 ug/l

Precision: Unknown

Source: Thompson, M., et al.; "Water Analysis by Inductively Coupled Plasma Atomic-emission Spectrometry after a Rapid Pre-concentration", Analyst, 107 (1982), 1330-4.

Analyte: Phosphorous (2)

Procedure: A: Add sulfuric acid, ammonium molybdate, amino solution, determine colorimetrically
B: Add phenophthalien, ascorbic acid, antimony, potassium tartrate, ammonium molybdate, determine colorimetrically

Range: A: 0.01 - 3 mg/l
B: 0.01 - 0.5 mg/l

Precision: A: 5%
B: 1%

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method, D 515-82A, B.

Analyte: Phosphorous (3)

Procedure: Analyze aqueous sample using an Autoanalyzer II with colorimeter and reagents ammonium molybdate and ascorbic acid

Range: 50 - 3 000 mg/kg

Precision: 2%

Source: Aspila, K.A., Agemian, H., Chan, A.S.Y.; "A Semi-Automated Method for the Determination of Inorganic, Organic and Total Phosphate in Sediments", Analyst, 101 (1976).

Analyte: Polychlorinated Biphenyls (PCB) (1)

Procedure: GC/MS determination with packed column

Range: See method

Precision: See method

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8250.

Analyte: Polychlorinated Biphenyls (PCB) (2)

Procedure: Determination with GC/ECD

Range: See method

Precision: See method

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8080.

Analyte: Potassium (1)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Potassium (2)

Procedure: Acidify, concentrate, determine with ICP AE

Range: MDQ 9 ug/l

Precision: Unknown

Source: Thompson, M., et al.; "Water Analysis by Inductively Coupled Plasma Atomic-emission Spectrometry after a Rapid Pre-concentration", Analyst, 107 (1982), 1330-4.

Analyte: Potassium Hydroxide

Procedure: Add phenolphthalein, titrate with sulfuric acid, add bromocresol green, back-titrate with sulfuric acid

Range: 0 - 10 000 mg/kg

Precision: 10%

Source: Hach Co., Hach Water Analysis Handbook, 1981.

Analyte:	iso-Propanol (1)
Procedure:	Add ceric ammonium nitrate, determine colorimetrically
Range:	200 - 10 000 mg/l
Precision:	10%
Source:	Reid, V.W., Truelove, R.K.; "The Colorimetric Determination of Alcohols", The Analyst, 77 (1952), 325.

Analyte:	iso-Propanol (2)
Procedure:	Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range:	MDQ ~1 mg/l
Precision:	Unknown
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte:	iso-Propylbenzene
Procedure:	Add tetracyanoethylene, determine colorimetrically
Range:	0 - 15 000 mg/kg
Precision:	10%
Source:	Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte:	Propylene Glycol (1)
Procedure:	Add periodic acid, sodium bicarbonate, potassium iodide, arsenious acid, titrate with iodine
Range:	0 - 500 mg/l
Precision:	10%
Source:	Lehman, A.J., Newman, H.W.; J. Pharmacol. Exptl. Therap., 60 (1937) 312.

Analyte: Propylene Glycol (2)

Procedure: Determine with HPLC

Range: MDQ 5 ug/l

Precision: Unknown

Source: Baust, J.G., et al.; "Comparative Separation of Low-Molecular-Weight Carbohydrates and Polyols by High-Performance Liquid Chromatography: Radially Compressed Amine Modified Silica versus Ion Exchange", J. of Chromatography, 261 (1983), 65-75.

Analyte: Propylene Oxide

Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.

Range: MDQ ~1 mg/l

Precision: Unknown

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Sodium (1)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Sodium (2)

Procedure: Acidify, concentrate, determine with ICP AE

Range: MDQ 20 ug/l

Precision: Unknown

Source: Thompson, M., et al.; "Water Analysis by Inductively Coupled Plasma Atomic-emission Spectrometry after a Rapid Pre-concentration", Analyst, 107 (1982), 1330-4.

Analyte: Sodium (3)
Procedure: Add magnesium acetate, determine with ion-sensitive electrode
Range: Unknown
Precision: Unknown
Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 147.

Analyte: Sodium Carbonate
Procedure: Add phenolphthalien, titrate with sulfuric acid, add bromocresol green, back titrate with sulfuric acid
Range: 0 - 10 000 mg/l
Precision: 10%
Source: Hach Co., Hach Water Analysis Handbook, 1981.

Analyte: Sodium Hydroxide
Procedure: Add phenolphthalien, titrate with sulfuric acid, add bromocresol green-methyl red, back titrate with sulfuric acid
Range: 0 - 10 000 mg/l
Precision: 10%
Source: Hach Co., Hach Water Analysis Handbook, 1981.

Analyte: Styrene (1)
Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.
Range: MDQ ~1 mg/l
Precision: Unknown
Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Styrene
Procedure: Extract with ether, determine with GC/FID
Range: Unknown
Precision: Unknown
Source: Clements, L.D., Shang-ta, W.C.; "Charachterization of Hydrocarbon Pollutant Burdens in Petrochemical and Refinery Process Streams", Environ. Inter., 7 (1982), 259-65.

Analyte:	Sulfate (1)
Procedure:	I: Centrifuge sample, acidify, add barium chloride, centrifuge, add ethanol, centrifuge, and dry overnight, weigh barium sulfate formed II: Add iron chloride, filter, add barium chloride, gum acacia, determine turbidimetrically III: Reduce extract in boiling flask, add p-aminodimethylaniline, ammonium iron sulfate, determine colorimetrically
Range:	Unknown
Precision:	Unknown
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 321-3.

Analyte:	Sulfate (2)
Procedure:	Pass aqueous solution through ion-exchange column, add ethanol, adjust pH with HCl or ammonium hydroxide, add thorin, titrate with barium chloride
Range:	0 - 25 000 mg/kg
Precision:	10%
Source:	Environment Canada; Analytical Methods Manual, 1974.

Analyte:	Sulfur
Procedure:	Acidify, concentrate, determine with ICP AE
Range:	MDQ 8 ug/l
Precision:	Unknown
Source:	Thompson, M., et al.; "Water Analysis by Inductively Coupled Plasma Atomic-emission Spectrometry after a Rapid Pre-concentration", Analyst, 107 (1982), 1330-4.

Analyte:	Sulfuric Acid
Procedure:	Add phenolphthalein, titrate to endpoint with sodium hydroxide
Range:	0 - 10 000 mg/l
Precision:	10%
Source:	Hach Co., Hach Water Analysis Handbook, 1981.

Analyte: Tetrachloroethylene

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: 0.50 - 35 ug/l

Precision: SD 18.1%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Titanium (1)

Procedure: Determine by direct aspiration into a nitrous oxide-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA, Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 C.

Analyte: Titanium (2)

Procedure: Acidify, concentrate, determine with ICP AE

Range: MDQ 5 ug/l

Precision: Unknown

Source: Thompson, M., et al.; "Water Analysis by Inductively Coupled Plasma Atomic-emission Spectrometry after a Rapid Pre-concentration", Analyst, 107 (1982), 1330-4.

Analyte: Toluene (1)

Procedure: Add tetracyanoethylene, determine colorimetrically

Range: 0 - 2 500 mg/l

Precision: 10%

Source: Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte: Toluene (2)

Procedure: Determination with GC/PID with direct, purge and trap or headspace injection

Range: 0.5 - 100 ug/l

Precision: SD 12.1%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8020.

Analyte: Triallate (1)

Procedure: Adjust pH, extract with hexane, clean-up with Florisil, determine with GC/ECD

Range: MDQ 0.1 ppb

Precision: Unknown

Source: Cessna, A.J., et al.; "A Multiresidue Method for the Analysis and Verification of Several Herbicides in Water", J. Agric. Food Chem., 33 (1985), 504-7.

Analyte: Triallate (2)

Procedure: Adjust pH, extract into dichloromethane, determine with GC/ECD

Range: MDQ 10 ng/l

Precision: Unknown

Source: Lee, H-B., Chau, A.S.Y.; "Determination of Trifuralin, Diallate, Triallate, Atrazine, Barban, Diclofop-Methyl, and Benzoylprop-Ethyl in Natural Waters at Parts per Trillion Levels", J. Assoc. Off. Anal. Chem., 66(3) (1983), 651-7.

Analyte: Triallate (3)

Procedure: Determine with HPLC

Range: 0.5 - 15 ug

Precision: 1%

Source: Heras, A.P., Sanchez-Rasero, F., "Determination of Carbamic Herbicides by High-Performance Liquid Chromatography", J. Chromatogr., 261 (1983), 166-71.

Analyte: Trichlorfon (1)

Procedure: Extract into hexane or benzene, determine with plasma chromatography

Range: 0.1 ng/ sample

Precision: Unknown

Source: Moye, H.A.; "Plasma Chromatography of Pesticides", J. Chromatogr. Sci., 13(6) (1975), 285-90.

Analyte: Trichlorfon (2)

Procedure: Extraction, determine with GC/MS

Range: Unknown

Precision: Unknown

Source: Spingarn, N.E., et al.; "Analysis of Non-volatile Organic HazardousSubstances by GC/MS", J. Chromatogr. Sci., 20 (1982), 571-74.

Analyte: 1,1,1-Trichloroethane

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: 0.37 - 29 ug/l

Precision: SD 12.5%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Trichlorofluoromethane

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: Unknown

Precision: Unknown

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Trifuralin (1)

Procedure: Adjust pH, extract with hexane, clean-up with Florisil, determine with GC/ECD

Range: MDQ 0.1 ppb

Precision: Unknown

Source: Cessna, A.J., et al.; "A Multiresidue Method for the Analysis and Verification of Several Herbicides in Water", J. Agric. Food Chem., 33 (1985), 504-7.

Analyte: Trifuralin (2)

Procedure: Adjust pH, extract into dichloromethane, determine with GC/ECD

Range: MDQ 10 ng/l

Precision: Unknown

Source: Lee, H-B., Chau, A.S.Y.; "Determination of Trifuralin, Diallate, Triallate, Atrazine, Barban, Diclofop-Methyl, and Benzoylprop-Ethyl in Natural Waters at Parts per Trillion Levels", J. Assoc. Off. Anal. Chem., 66(3) (1983), 651-7.

Analyte: Trinitrotoluene

Procedure: Adsorb on Porapak resin, desorb with acetone, determine with HPLC

Range: Unknown

Precision: Unknown

Source: Maskarinec, M.P., et al.; "Determination of Munitions Components in Water by Resin Adsorption and High-Performance Liquid Chromatography-Electrochemical Detection", J. Chromatogr., 302 (1984), 51-63.

Analyte: Urea (1)

Procedure: Add p-dimethylaminobezaldehyde, determine colorimetrically

Range: 0 - 200 mg/l

Precision: 10%

Source: Watt, G.W., Chrisp, J.D.; Anal. Chem., 26(3) (1954).

Analyte: Urea (2)

Procedure: Determine with HPLC

Range: MDQ 5 ug/l

Precision: Unknown

Source: Baust, J.G., et al.; "Comparative Separation of Low-Molecular-Weight Carbohydrates and Polyols by High-Performance Liquid Chromatography: Radially Compressed Amine Modified Silica versus Ion Exchange", J. of Chromatography, 261 (1983), 65-75.

Analyte: Vinyl Acetate

Procedure: Determine with direct aqueous injection/GC/FID. This paper gives Kovats indices for over 100 volatile organics.

Range: MDQ ~1 mg/l

Precision: Unknown

Source: ASTM, Annual Book of ASTM Standards, Part 11: Water, 1982, Method D 3695 - 82.

Analyte: Vinyl Chloride

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: 0.82 - 32.3 ug/l

Precision: SD 11.4%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Xylenes (1)

Procedure: Add tetracyanoethylene, determine colorimetrically

Range: 0 - 1 500 mg/l

Precision: 10%

Source: Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte: Xylenes (2)

Procedure: Determination with GC/PID with direct, purge and trap or headspace injection

Range: MDQ 0.2 ug/l

Precision: Unknown

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8020.

Analyte: Zinc (1)

Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy

Range: 50 - 1000 ug/l

Precision: See method

Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Zinc (2)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Zinc (3)

Procedure: B: Adjust pH, add dithizone, determine colorimetrically
C: Adjust pH, add methyl red, sodium citrate, carbon tetrachloride, extract, add dithizone, extract, add dithizone, determine colorimetrically
D: Add sodium ascorbate, buffer, potassium cyanide, zincon, cyclohexane, determine colorimetrically

Range: Unknown

Precision: A: 18.2%
B: Unknown
C: 1%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 328 B, C, D.

Analyte:	Zinc (4)
Procedure:	Follow copper procedure up to the separation of the first aqueous phase, add ammonium citrate buffer, adjust pH, extact into dithiozine, add HCl, add buffer, dithiozone, carbamate, determine colorimetrically
Range:	0 - 3 ug/ml
Precision:	Unknown
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 430.

Compound	IN SOIL	Method No.
Acetic Anhydride		S2
Acetone		S3
Acrylonitrile		S5
Adipic Acid		S2
Aluminum (1) *(and 14 other metals)		7a
Aluminum (2) *(and 9 other metals)		7b
Aluminum (3)		7c
Aluminum (4)		S7d
Arsenic (1)		17a
Arsenic (2)		17b
Barium (1)		7b
Barium (2)		S18
Benzene (1)		S19a
Benzene (2) *(and 48 other priority pollutants)		S19b
Boric Acid		S2
Boron (1)		7a
Boron (2)		21a
Boron (3)		S21b
1-Butanol		S24
iso- and n-Butyraldehyde		S3
Calcium (1) *(and 26 other metals)		27a
Calcium (2) *(and 31 other metals)		27b
Carbofuran		S37
Carbon Disulfide *(and 5 other nonhalogenated volative organics)		39
Carbon Tetrachloride *(and 39 other halogenated volatile organics)		40
Carbonate		S38
Chloride		42
Chlorobenzene		S19b
Chloroform		40
Copper (1)		7a
Copper (2)		27b
Copper (3)		S27b
Cresols *(and 16 other phenols)		48

Dicamba	S58
Dichlorobenzenes	S19b
1,2-Dichloroethane	40
Dichloromethane *(and 30 other volatile organics)	56
2,4-Dichlorophenoxyacetic Acid *(and 9 other acid and hydroxybenzonitrile herbicide residues)	S58
Dinoseb	S62
Ethanol	S24
Ethylbenzene (1)	S19a
Ethylbenzene (2)	S19b
Ethylene Glycol	S66
Flouride	72
Hydrazine	75
Iron (1)	7a
Iron (2)	27a
Lead (1)	7a
Lead (2)	27a
Magnesium (1)	27a
Magnesium (2)	S87
Malathion	S89
Maleic Anhydride	S2
Mercury (1)	7a
Mercury (2)	93a
Mercury (3)	S93b
Methanol	S24
Methyl ethyl Ketone (1)	S3
Methyl ethyl Ketone (2)	39
Methyl isobutyl Ketone (1)	S3
Methyl isobutyl Ketone (2)	39
Morpholine	S99
Nitrilotriacetic Acid	S2
Pentachlorophenol	48
Phenol	48
Phenols	108a
Phosphate	109

Phosphorous (1)	110a
Phosphorous (2)	110b
Polychlorinated Biphenyls (PCB) (1)	111a
*(and 63 other semivolatile organics)	
Polychlorinated Biphenyls (PCB) (2)	111b
*(and 20 other organochlorine pesticides)	
Phthalic Anhydride	S2
Potassium	27a
iso-Propanol	S24
iso-Propylbenzene	S19a
Propylene Glycol	S119
Sodium (1)	27a
Sodium (2)	27b
Sodium (3)	S121
Sulfate (1)	S138a
Sulfate (2)	S138b
Sulfur	S140
Tetrachloroethylene	40
p-Terphenyl	S19a
Titanium	7b
Toluene	S19a
Triallate (1)	S150a
Triallate (2) *(and 6 other neutral herbicides)	S150b
1,1,1-Trichloroethane	40
Trichlorofluoromethane	40
Trifuralin (1)	S150b
Trifuralin (2)	S153a
Trifuralin (3)	S153B
Urea	S156
Vinyl Acetate	S157
Vinyl Chloride	40
Xylenes (1)	S19a
Xylenes (2) *(and 7 other volatile aromatic organics)	19b
Zinc (1)	7a
Zinc (2)	27a

Zinc (3) 161a
Zinc (4) S161b

Analyte: Acetic Anhydride
Procedure: Hydrolysis and sodium hydroxide titration
Range: 500 - 5000 mg/kg
Precision: 10%
Source: Smith, D.M., Bryant, W.M.D.; J. Am. Chem. Soc., 58 (1936), 2452.

Analyte: Acetone
Procedure: Treat with 2,4-dinitrophenylhydrazine and potassium hydroxide, determine colorimetrically
Range: 0 - 1200 mg/kg
Precision: 10%
Source: Critchfield, F.E.; Organic Functional Group Analysis, Permagon Press, New York, 1963.

Analyte: Acrylonitrile
Procedure: Treat with morpholine, methyl cellosolve, acetic anhydride, thymol blue/xylene cyanol FF, titrate with perchloric acid
Range: 500 - 4000 mg/kg
Precision: 10%
Source: Critchfield, F.E.; Organic Funtional Group Analysis, Permagon Press, New York, 1963.

Analyte: Adipic Acid
Procedure: Sodium hydroxide titration
Range: 200 - 4000 mg/kg
Precision: 10%
Source: Smith, D.M., Bryant, W.M.D.; J. Am. Chem. Soc., 58 (1936), 2452.

Analyte: Aluminum (1)
Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy
Range: 50 - 190 ug/l
Precision: See method
Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Aluminum (2)

Procedure: Determine by direct aspiration of the soil extract into a nitrous oxide-acetylene flame of an atomic absorption spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 C.

Analyte: Aluminum (3)

Procedure: Add sulphuric acid, buffer, determine colorimetrically

Range: Unknown

Precision: RSD 30%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 306 B.

Analyte: Aluminum (4)

Procedure: Add buffer to soil extract, xylenol orange, EDTA, determine colorimetrically

Range: 0 - 1 mg/ml

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 345.

Analyte: Arsenic (1)

Procedure:
A: Add hydrochloric acid, potassium iodide, stannous chloride to sample in arsine generator, prepare scrubber and absorber with silver diethyldithiocarbamate, add zinc to generator, determine arsine colorimetrically
B: Adjust pH, add sulfuric acid, nitric acid, cool, add hydrochloric acid, potassium iodide, stannous chloride to sample in arsine generator, or (add sodium borohydride), read maximum atomic absorbance value
C: Add nitric acid, nickel nitrate, determine with a graphite furnace AA

Range:
A: 5 - 250 ug/l
B: 1 - 20 ug/l
C: 5 - 100 ug/l

Precision:
A: 5%
B: 10%
C: 8%

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 2972-84A, B, C.

Analyte: Arsenic (2)

Procedure: Add sulfuric acid, nitric acid, boil, add perchloric acid, cool, determine using AA with a heated combustion tube with the sample being fed in by a proportioning pump along with hydrochloric acid and sodium borohydride

Range: 0.0002 - 0.0050 mg/l

Precision: 8.5%

Source: Pierre, F.C., Lamoreux, T.C., et.al.; "An Automated Technique for the Sub-microgram Determination of Se and As in Surface Waters by Atomic Absorption Spectroscopy", Applied Spectroscopy, 30(1) (1976).

Analyte: Barium (1)

Procedure: Determine by direct aspiration of the soil extract into a nitrous oxide-acetylene flame of an atomic absorption spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 C.

Analyte: Barium (2)

Procedure: Add nitric acid to soil extract, neutralize, add ammonium nitrate, heat, add potassium chromate, filter, determine colorimetrically

Range: 0 - 1 000 ug/ml

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 382.

Analyte: Benzene (1)

Procedure: Tetracyanoethylene colorimetric test

Range: 0 - 15 000 mg/kg

Precision: 10%

Source: Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte: Benzene (2)

Procedure: Determine with Headspace-GC/FID.

Range: Unknown

Precision: RSD < 25%

Source: Kiang, Patty H., Grob, Robert L.; "A Headspace Technique for the Determination of Volatile Compounds in Soil, and Development of a Screening Method for the Determination of 49 Priority Pollutants in Soil", J. Environ. Sci. Health, A21(1) (1986) 15-53.

Analyte: Boric Acid

Procedure: Sodium hydroxide titration

Range: 500 - 5000 mg/kg

Precision: 10%

Source: Smith, D.M., Bryant, W.M.D.; J. Am. Chem. Soc., 58 (1936), 2452.

Analyte: Boron (1)

Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy

Range: 50 - 1000 ug/l

Precision: See method

Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Boron (2)

Procedure: A: Pass aqueous sample through acid column, add curcumin, evaporate off water, dissolve product in ethanol, determine colorimetrically
B: Adjust pH, evaporate water, add HCl, sulfuric acid, carmine, determine colorimetrically

Range: A: 0.1 - 1 mg/l
B: 1 - 10 mg/l

Precision: A: RSD 22.8%
B: RSD 35.5%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 404 A, B.

Analyte: Boron (3)

Procedure: Reflux with barium chloride, centrifuge, add calcium hydroxide to an aliquot and evaporate, acidify, add curcurim, heat, centrifuge, determine by measuring the optical density

Range: 0.2 - 0.8 ug/aliquot

Precision: CV .03

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 388.

Analyte: 1-Butanol

Procedure: Treat with ceric ammonium nitrate, determine colorimetrically

Range: 2000 - 40 000 mg/kg

Precision: 10%

Source: Reid, V.W., Truelove, R.K.; "The Colorimetric Determination of Alcohols", The Analyst, 77 (1952), 325.

Analyte: iso- and n-Butyraldehyde

Procedure: Treat with 2,4-dinitrophenylhydrazine, potassium hydroxide, pyridine, determine colorimetrically

Range: iso- 0 - 150 mg/kg / n- 0 - 200 mg/kg

Precision: 10%

Source: Critchfield, F.E.; Organic Funtional Group Analysis, Permagon Press, New York, 1963.

Analyte: Calcium (1)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte:	Calcium (2)
Procedure:	II: Add potassium cyanide, hydroxylamine hydrochloride, triethanolamine, sodium hydroxide, Calcon to soil extract, titrate with EDTA III: Add methanol, buffer to soil extract, adjust pH, add reagent solution, determine colorimetrically
Range:	Unknown
Precision:	II: Unknown III: RSD 0.6%
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 120-3.

Analyte:	Calcium (3)
Procedure:	II: Add potassium cyanide, hydroxylamine hydrochloride, triethanolamine, sodium hydroxide, Calcon to soil extract, titrate with EDTA III: Add methanol, buffer to soil extract, adjust pH, add reagent solution, determine colorimetrically
Range:	Unknown
Precision:	II: Unknown III: RSD 0.6%
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 120-3.

Analyte:	Carbofuran
Procedure:	Extract with methanol, determine with HPLC
Range:	MDQ 1 ppm
Precision:	SD 5%
Source:	Lauren, D.R.; "Simplified Method for Liquid Chromatographic Determination of Carbofuran in Soils", J. Assoc. Off. Anal. Chem., 67(3) (1984), 655-7.

Analyte:	Carbon Disulfide
Procedure:	GC/FID determination using direct, purge and trap or headspace injection
Range:	Unknown
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8015.

Analyte: Carbon Tetrachloride

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: 0.55 - 50 ug/l

Precision: SD 25.6%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Carbonate

Procedure: Add phenolpthalein to soil extract, titrate with sulphuric acid, add methyl orange, titrate again with sulphuric acid.

Range: Unknown

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 83.

Analyte: Chloride

Procedure:
A: Adjust pH, add diphenylcarbazone-bromophenol blue, titrate with silver nitrate
B: Adjust pH, add potassium chromate, titrate with silver nitrate
C: Add ferrous ammonium sulfate, mercuric thiocyanate, determine colorimetrically
D: Add chloride ion strength adjustor, determine with chloride ion-selective electrode

Range:
A: Unknown
B: > 5 ug/l
C: 0.1 - 10 mg/l
D: > 1 g/l

Precision:
A: 2%
B: 1%
C: 5%
D: Unknown

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 512-81A, B, C, D.

Analyte:	Chlorobenzene
Procedure:	Determine with Headspace-GC/FID.
Range:	Unknown
Precision:	RSD < 25%
Source:	Kiang, Patty H., Grob, Robert L.; "A Headspace Technique for the Determination of Volatile Compounds in Soil, and Development of a Screening Method for the Determination of 49 Priority Pollutants in Soil", J. Environ. Sci. Health, A21(1) (1986) 15-53.

Analyte:	Chloroform
Procedure:	GC/ECD determination using direct, purge and trap or headspace injection
Range:	0.44 - 50 ug/l
Precision:	SD 20.6%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte:	Copper (1)
Procedure:	Determination with d-c argon plasma atomic emission (AE) spectroscopy
Range:	50 - 1000 ug/l
Precision:	See method
Source:	ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte:	Copper (2)
Procedure:	Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer
Range:	Unknown
Precision:	Unknown
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Copper (3)

Procedure: Adjust pH of aqueous sample, add bromthymol blue, acidify, add phenolphtalien, titrate with ammonium hydroxide

Range: Unknown

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 399.

Analyte: Cresols

Procedure: Determination with GC/FID or derivitization and determination with GC/ECD

Range: Unknown

Precision: Unknown

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8040.

Analyte: Dicamba

Procedure: Extract with saturated calcium hydroxide, ethylate with iodoethane, ion-pair alkylation, determine wityh GC/ECD

Range: Unknown

Precision: Unknown

Source: Cotterill, E.G.; "Determination fo Acid and Hydroxybenzonitrile Herbicide residues in Soil by Gas-Liquid Chromatography after Ion-pair Alkylation", Anaylst, 107 (1982), 76-81.

Analyte: Dichlorobenzenes

Procedure: Determine with Headspace-GC/FID.

Range: Unknown

Precision: RSD < 25%

Source: Kiang, Patty H., Grob, Robert L.; "A Headspace Technique for the Determination of Volatile Compounds in Soil, and Development of a Screening Method for the Determination of 49 Priority Pollutants in Soil", J. Environ. Sci. Health, A21(1) (1986) 15-53.

Analyte:	1,2-Dichloroethane
Procedure:	GC/ECD determination using direct, purge and trap or headspace injection
Range:	0.55 - 50 ug/l
Precision:	SD 25.6%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte:	Dichloromethane
Procedure:	GC/MS determination
Range:	MDQ 2.8 ug/l
Precision:	SD 28%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8240.

Analyte:	2,4-Dichlorophenoxyacetic Acid
Procedure:	Extract with saturated calcium hydroxide, ethylate with iodoethane, ion-pair alkylation, determine wityh GC/ECD
Range:	Unknown
Precision:	Unknown
Source:	Cotterill, E.G.; "Determination fo Acid and Hydroxybenzonitrile Herbicide residues in Soil by Gas-Liquid Chromatography after Ion-pair Alkylation", Anaylst, 107 (1982), 76-81.

Analyte:	Dinoseb
Procedure:	Extract by hot hydrolysis with methanol-sulfuric acid, partition into ether, absorb onto basic alumina, elute with sodium bicarbonate, ether partition, diazomethane methylation, absorb onto acidic alumina, elute with ether, determine with GC/ECD.
Range:	MDQ 20 pg
Precision:	Unknown
Source:	Gardner, Robert C., McKellar, Richard L.; "A Method to Determine Dinoseb Residues in Crops and Soil by Gas Chromatography", J. Agric. Food Chem. 28 (1980), 258-61.

Analyte:	Ethanol
Procedure:	Add ceric ammonium nitrate, determine colorimetrically
Range:	2 000 - 35 000 mg/kg
Precision:	10%
Source:	Reid, V.W., Truelove, R.K.; "The Colorimetric Determination of Alcohols", The Analyst, 77 (1952), 325.

Analyte:	Ethylbenzene (1)
Procedure:	Add tetracyanoethylene to solution, determine colorimetrically
Range:	0 - 10000 mg/kg
Precision:	10%
Source:	Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte:	Ethylbenzene (2)
Procedure:	Determine with Headspace-GC/FID.
Range:	Unknown
Precision:	RSD < 25%
Source:	Kiang, Patty H., Grob, Robert L.; "A Headspace Technique for the Determination of Volatile Compounds in Soil, and Development of a Screening Method for the Determination of 49 Priority Pollutants in Soil", J. Environ. Sci. Health, A21(1) (1986) 15-53.

Analyte:	Ethylene Glycol
Procedure:	Add periodic acid, sodium bicarbonate, arsenious acid, starch indicator, titrate with iodine
Range:	100 - 3 000 mg/kg
Precision:	10%
Source:	Lehman, A.J., Newman, H.W.; J. Pharmacol. Exptl. Therap., 60 (1937), 312.

Analyte:	Flouride
Procedure:	A: Distill from sulfuric acid, add acid zirconyl-SPADNS reagent, determine colorimetrically B: Determine using ion-specific electrode
Range:	A: 0 - 1.40 mg/l B: 0.1 - 1000 mg/l
Precision:	A: 8.9% B: 3.0%
Source:	ASTM, Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 1179-80A, B.

Analyte:	Hydrazine
Procedure:	Add p-dimethylaminobenzaldehyde, determine colorimetrically
Range:	5 - 200 ug/l
Precision:	3%
Source:	ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 1385-86.

Analyte:	Iron (1)
Procedure:	Determination with d-c argon plasma atomic emission (AE) spectroscopy
Range:	50 - 1000 ug/l
Precision:	See method
Source:	ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte:	Iron (2)
Procedure:	Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer
Range:	Unknown
Precision:	Unknown
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Lead (1)

Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy

Range: 200 - 1000 ug/l

Precision: See method

Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Lead (2)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Magnesium (1)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Magnesium (2)

Procedure: III. Add polyvinyl alcohol, sodium hydrogen sulphite, thiazole yellow, sodium hyroxide to soil extract, determine colorimetrically
IV. Evaporate aqueous sample dry, add nitric acid, centrifuge, add sulphuric acid, ethanol, centrifuge, decant liquid, add buffer, potassium cyanide, hydroxylamine, Eriochrome Black T and titrate with EDTA

Range: < 3 ug/ml and Unknown

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 125, 123.

Analyte: Malathion

Procedure: Soxhlet extraction, clean-up with adsorption chromatography, determine with GC/NPD

Range: 95 - 225 ng/kg

Precision: ~ 5%

Source: Kjolholt, J., "Determination of Trace Amounts of Organophosphorous Pesticides and Related Compounds in Soils and Sediments Using Capillary Gas Chromatography and a Nitrogen-Phosphorous Detector", J. Chromatogr., 325 (1985), 231-8.

Analyte: Maleic Anhydride

Procedure: Add pyridine/water solution, titrate with sodium hydroxide

Range: 250 - 5 000 mg/kg

Precision: 10%

Source: Smith, D.M., Bryant, W.M.D.; J. Am. Chem. Soc., 58 (1936), 2452.

Analyte: Mercury (1)

Procedure: Determination with d-c argon plasma atomic emission (AE) spectroscopy

Range: 200 - 1000 ug/l

Precision: See method

Source: ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Mercury (2)

Procedure: Add potassium permanganate, sufuric acid, boil, add dithizone, hydroxylamine hydrochloride, extract, determine colorimetrically

Range: 0.2 - 10 ug/l

Precision: 5%

Source: ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 3223-86.

Analyte: Mercury (3)

Procedure: Digest soil in acid, extract into dithizone, then water, add buffer, EDTA, determine colorimetrically

Range: Unknown

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 410-3.

Analyte: Methanol

Procedure: Add ceric ammonium nitrate to solution, determine colorimetrically

Range: 2 000 - 40 000 mg/kg

Precision: 10%

Source: Reid, V.W., Truelove, R.K.; "The Colorimetric Determination of Alcohols", The Analyst, 77 (1952), 325.

Analyte: Methyl ethyl Ketone (1)

Procedure: Add 2,4-dinitrophenylhydrazine to water solution, potassium hydroxide, pyridine, determine colorimetrically

Range: 0 - 500 mg/kg

Precision: 10%

Source: Critchfield, F.E.; Organic Functional Group Analysis, Permagon Press, New York, 1963.

Analyte: Methyl ethyl Ketone (2)

Procedure: GC/FID determination using direct, purge and trap or headspace injection

Range: Unknown

Precision: Unknown

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8015.

Analyte:	Methyl isobutyl Ketone (1)
Procedure:	Add 2 4-dinitrophenylhydrazine to water solution, potassium hydroxide, pyridine, determine colorimetrically
Range:	0 - 500 mg/kg
Precision:	10%
Source:	Critchfield, F.E.; Organic Functional Group Analysis, Permagon Press, New York, 1963.

Analyte:	Methyl isobutyl Ketone (2)
Procedure:	GC/FID determination using direct, purge and trap or headspace injection
Range:	Unknown
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8015.

Analyte:	Morpholine
Procedure:	Add acrylonitrile, methanol to water solution, add methyl cellosolve, acetic anhydride, thymol blue/xylene cyanol FF, titrate with perchloric acid
Range:	500 - 5 000 mg/kg
Precision:	10%
Source:	Critchfield, F.E.; Organic Functional Group Analysis, Permagon Press, New York, 1963.

Analyte:	Nitrilotriacetic Acid
Procedure:	Titrate with sodium hydroxide
Range:	250 - 5 000 mg/kg
Precision:	10%
Source:	Smith, D.M., Bryant, W.M.D.; J. Am. Chem. Soc., 58 (1936), 2452.

Analyte: Pentachlorophenol

Procedure: Determination with GC/FID or derivitization and determination with GC/ECD

Range: Unknown

Precision: SD 8.8%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8040.

Analyte: Phenol

Procedure: Determination with GC/FID or derivitization and determination with GC/ECD

Range: 0.76 - 3.8 ug/l

Precision: SD 8.4%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8040.

Analyte: Phenols

Procedure: B: Distill sample, react with 4-aminoantipyrine and potassium ferricyanide, extract with chloroform, determine colorimetrically
C: Add ammonium hydroxide, buffer, 4-aminoantipyrine, potassium ferricyanide, determine colorimetrically
D: Determine by direct aqueous injection into GC/ECD

Range: B: 0.015 - 0.150 mg/l
C: MDQ > 100 ug/l
D: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 510 B, C, D.

Analyte: Phosphate

Procedure: Add molybdate, reduce with ascorbic acid, determine colorimetrically

Range: 0.0050 - 0.10 mg/l

Precision: 1.9%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 424 F.

Analyte:	Phosphorous (1)
Procedure:	A: Add sulfuric acid, ammonium molybdate, amino solution, determine colorimetrically B: Add phenophthalien, ascorbic acid, antimony, potassium tartrate, ammonium molybdate, determine colorimetrically
Range:	A: 0.01 - 3 mg/l B: 0.01 - 0.5 mg/l
Precision:	A: 5% B: 1%
Source:	ASTM; Annual Book of ASTM Standards, Part 11: Water, 1988, Method D 515-82A, B.

Analyte:	Phosphorous (2)
Procedure:	Analyze aqueous sample using an Autoanalyzer II with colorimeter and reagents ammonium molybdate and ascorbic acid
Range:	50 - 3 000 mg/kg
Precision:	2%
Source:	Aspila, K.A., Agemian, H., Chan, A.S.Y.; "A Semi-Automated Method for the Determination of Inorganic, Organic and Total Phosphate in Sediments", Analyst, 101 (1976).

Analyte:	Phthalic Anhydride
Procedure:	Titrate with sodium hydroxide
Range:	200 - 4 000 mg/kg
Precision:	10%
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 12th Ed. (1965).

Analyte:	Polychlorinated Biphenyls (PCB) (1)
Procedure:	GC/MS determination with packed column
Range:	See method
Precision:	See method
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8250.

Analyte: Polychlorinated Biphenyls (PCB) (2)

Procedure: Determination with GC/ECD

Range: See method

Precision: See method

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8080.

Analyte: Potassium

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: iso-Propanol

Procedure: Add ceric ammonium nitrate to solution, determine colorimetrically

Range: 2 000 - 50 000 mg/kg

Precision: 10%

Source: Reid, V.W., Truelove, R.K.; "The Colorimetric Determination of Alcohols", The Analyst, 77 (1952), 325.

Analyte: iso-Propylbenzene

Procedure: Add tetracyanoethylene, determine colorimetrically

Range: 0 - 15 000 mg/kg

Precision: 10%

Source: Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11), 1961.

Analyte:	Propylene Glycol
Procedure:	Add periodic acid, sodium bicarbonate, potassium iodide, arsenious acid, starch indicator, titrate with iodine
Range:	150 - 3000 mg/kg
Precision:	10%
Source:	Lehman, A.J., Newman, H.W.; J. Pharmacol. Exptl. Therap., 60 (1937), 312.

Analyte:	Sodium (1)
Procedure:	Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer
Range:	Unknown
Precision:	Unknown
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte:	Sodium (2)
Procedure:	Add magnesium acetate to soil extract, determine with ion-sensitive electrode
Range:	Unknown
Precision:	Unknown
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 147.

Analyte:	Sodium (3)
Procedure:	Add magnesium acetate, determine with ion-sensitive electrode
Range:	Unknown
Precision:	Unknown
Source:	Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 147.

Analyte: Sulphate (1)

Procedure: I: Centrifuge sample, acidify, add barium chloride, centrifuge, add ethanol, centrifuge, and dry overnight, weigh barium sulfate formed
II: Add iron chloride, filter, add barium chloride, gum acacia, determine turbidimetrically
III: Reduce extract in boiling flask, add p-aminodimethylaniline, ammonium iron sulfate, determine colorimetrically

Range: Unknown

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 321-3.

Analyte: Sulfate (2)

Procedure: Pass aqueous solution through ion-exchange column, add ethanol, adjust pH with HCl or ammonium hydroxide, add thorin, titrate with barium chloride

Range: 0 - 25 000 mg/kg

Precision: 10%

Source: Environment Canada; Analytical Methods Manual, 1974.

Analyte: Sulfur

Procedure: Dry soil under vacuum over phosphorous pentoxide and alkaline pyrogallol, grind sample, add acetone, shake then centrifuge, add aliquot to water, agitate, determine colorimetrically

Range: < 200 ug/ml

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 326.

Analyte: Tetrachloroethylene

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: 0.50 - 35 ug/l

Precision: SD 18.1%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte:	p-Terphenyl
Procedure:	Add tetracyanoethylene to solution, determine colorimetrically
Range:	0 - 15 000 mg/kg
Precision:	10%
Source:	Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte:	Titanium
Procedure:	Determine by direct aspiration of the soil extract into a nitrous oxide-acetylene flame of an atomic absorption spectrometer
Range:	See method
Precision:	See method
Source:	AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 C.

Analyte:	Toluene
Procedure:	Add tetracyanoethylene to solution, determine colorimetrically
Range:	0 - 10 000 mg/kg
Precision:	10%
Source:	Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte:	Triallate (1)
Procedure:	Extract with methanol, determine with HPLC
Range:	MDQ 0.1 ppm
Precision:	2.5%
Source:	Heras, A.P., Sanchez-Rasero, F.; "High-Performance Liquid Chromatographic Determination of Triallate Residues in Soils", J. Chromatogr. 358 (1986), 302-6.

Analyte: Triallate (2)

Procedure: Extract with acetone, clean-up with Florisil, determine with GC/ECD

Range: MDQ ppb (MDQ = Minimum Detectable Quantity)

Precision: Unknown

Source: Lee, H-B., Chau, A.S.Y.; "Gas Chromatographic Determination of Trifuralin, Diallate, Triallate, Atrazine, Barban, Diclofop-Methyl, and Benzoylprop-Ethyl in Sediments at Parts Per Billion Levels", J. Assoc. Off. Anal. Chem., 66(6) (1983), 1322-26.

Analyte: 1,1,1-Trichloroethane

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: 0.37 - 29 ug/l

Precision: SD 12.5%

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Trichlorofluoromethane

Procedure: GC/ECD determination using direct, purge and trap or headspace injection

Range: Unknown

Precision: Unknown

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte: Trifuralin (1)

Procedure: Extract with acetone, clean-up with Florisil, determine with GC/ECD

Range: MDQ ppb

Precision: Unknown

Source: Lee, H-B., Chau, A.S.Y.; "Gas Chromatographic Determination of Trifuralin, Diallate, Triallate, Atrazine, Barban, Diclofop-Methyl, and Benzoylprop-Ethyl in Sediments at Parts Per Billion Levels", J. Assoc. Off. Anal. Chem., 66(6) (1983), 1322-26.

Analyte:	Trifuralin (2)
Procedure:	Extract with acetone, determine with GC/FID
Range:	Unknown
Precision:	Unknown
Source:	Manual of Chemical Methods for Pesticides and Devices, U.S.EPA Office of Pesticide Programs, Published by The Association of Official Analytical Chemists, July 1976.

Analyte:	Trifuralin (3)
Procedure:	Extract with acetone, determine using infrared spectroscopy (see appendix for spectrograph)
Range:	Unknown
Precision:	Unknown
Source:	Manual of Chemical Methods for Pesticides and Devices, U.S.EPA Office of Pesticide Programs, Published by The Association of Official Analytical Chemists, July 1976.

Analyte:	Urea
Procedure:	Add p-dimethylaminobezaldehyde to solution, determine colorimetrically
Range:	0 - 4 500 mg/kg
Precision:	10%
Source:	Watt, G.W., Chrisp, J.D.; Anal. Chem., 26(3) 1954.

Analyte:	Vinyl Acetate
Procedure:	Add mercuric acetate, sodium bromide, phenolphthalein, titrate with potassium hydroxide
Range:	250 - 3000 mg/kg
Precision:	10%
Source:	Critchfield, F.E.; Organic Fuctional Group Analysis, Pergamon Press, New York, 1963.

Analyte:	Vinyl Chloride
Procedure:	GC/ECD determination using direct, purge and trap or headspace injection
Range:	0.82 - 32.2 ug/l
Precision:	SD 11.4%
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8010.

Analyte:	Xylenes (2)
Procedure:	Add tetracyanoethylene to solution, determine colorimetrically
Range:	0 - 7 500 mg/kg
Precision:	10%
Source:	Schinck, G.H., Ozolins, M.; "Complexometric Determination of Aromatic Hydrocarbons with Tetracyanoethylene", Anal. Chem., 33(11) (1961).

Analyte:	Xylenes (2)
Procedure:	Determination with GC/PID with direct, purge and trap or headspace injection
Range:	MDQ 0.2 ug/l
Precision:	Unknown
Source:	U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 8020.

Analyte:	Zinc (1)
Procedure:	Determination with d-c argon plasma atomic emission (AE) spectroscopy
Range:	50 - 1000 ug/l
Precision:	See method
Source:	ASTM; Annual Book of ASTM Standards, Part: 11, Water, 1988, Method D 4190-82.

Analyte: Zinc (2)

Procedure: Determine by direct aspiration into the air-acetylene flame of an atomic absorption (AA) spectrometer

Range: Unknown

Precision: Unknown

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 303 A.

Analyte: Zinc (3)

Procedure: B: Adjust pH, add dithizone, determine colorimetrically
C: Adjust pH, add methyl red, sodium citrate, carbon tetrachloride, extract, add dithizone, extract, add dithizone, determine colorimetrically
D: Add sodium ascorbate, buffer, potassium cyanide, zincon, cyclohexane, determine colorimetrically

Range: Unknown

Precision: A: 18.2%
B: Unknown
C: 1%

Source: AWWA; Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 328 B, C, D.

Analyte: Zinc (4)

Procedure: Follow copper procedure up to the separation of the first aqueous phase, add ammonium citrate buffer, adjust pH, extact into dithiozine, add HCl, add buffer, dithiozone, carbamate, determine colorimetrically

Range: 0 - 3 ug/ml

Precision: Unknown

Source: Hesse, P.R.; A Textbook of Soil Chemical Analysis, Chemical Publishing Co., New York, 1981, 430.

SAMPLE COLLECTION AND EXTRACTION TECHNIQUES

(T1)
Title: Standard Practices for Preparation of Sample Containers and for Preservation of Organic Constituents

Source: ASTM, Annual Book of ASTM Standards, Part: 31, Water, Method D 3694-82, 1982.

(T2)
Title: Collection and Preservation of Samples

Source: AWWA, Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), Method 105.

(T3)
Title: Acid-Base Clean-up Extraction

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3530.

(T4)
Title: Acid Digestion Procedure for Flame Atomic Absorption Spectroscopy

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3010.

(T5)
Title: Acid Digestion of Oils, Greases, or Waxes

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3030.

(T6)
Title: Acid Digestion of Sludges

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3050.

(T7)
Title: Dissolution Procedure for Oils, Greases, or Waxes

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3040.

(T8)
Title: Headspace Method

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 5020.

(T9)
Title: Continuous Liquid-Liquid Extraction

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3520.

(T10)
Title: Seperatory Funnel Liquid-Liquid Extraction

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3510.

(T11)
Title: Purge-and-Trap Method

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 5030.

(T12)
Title: Sonication Extraction

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3550.

(T13)
Title: Soxhlet Extraction

Source: U.S.EPA; EPA/SW-846 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, 2nd Ed. (1982), NTIS # PB87-120291, Method 3540.

ANALYTICAL METHODS OF A GENERAL NATURE

(G1)

Analyte: Organic constituents of workplace atmospheres

Procedure: The authors group contaminants by common chemical characteristics such as; carbonyl compounds and aromatic compounds. They give specific work-up procedures for each group with determination being done by HPLC.

Source: Purnell, C.J., et al.; "The Determination of Organic Contaminant Concentrations in Workplace Atmospheres by High-Performance Liquid Chromatography", source unknown.

(G2)

Analyte: Industrial Contaminants in workplace atmospheres

Procedure: The authors describe the determination of contaminants by GC/IR. The sample is introduced to the IR either directly from the GC or by trapping the components and introducing them later.

Source: Foster, R.D., Walker, R.F., "Identification of Industrial Contaminants by Infrared Analysis of Gas-Chromatographic Fractions", Analyst, 107 (1982), 1181-9.

(G3)

Analyte: Organics (from any matrix)

Procedure: The authors give Kovats indices for approximately 200 organic compounds on an SE-30 GC column

Source: Bredael, P.; "Retention Indices of Hydrocarbons on SE-30", J. HRC & CC, 5 (1982), 325-27.

(G4)

Analyte: Pesticides in wastewater

Procedure: The authors give a generalized approach to pesticide extraction and analysis in this paper.

Source: Miller, H., et al; "Development of Methods for Pesticides in Wastewater: Applicability of a General Approach", source unknown.

APPENDIX

(A1)
AWWA, Method 302, "Preliminary Treatment of Samples", (Referred to in some AWWA metal atomic absorbance methods.)

(A2)
AWWA, Method 303, "Metals by Atomic Absorption Spectrometry", (Also referred to by some of the AWWA metal AA methods.)

(A3)
AWWA, Method 314, "Hardness", (Referred to in some water methods.)

(A4)
IR spectra of 14 pesticides. They are Aldrin, Aminocarb, Carbaryl, Chlordane, Dicamba, 2,4-D, 2,4-D (isooctyl ester), Dinoseb, Fenitrothion, Malathion, MCPA, MCPA (isooctyl ester), Triallate, Trifuralin.

Source: Manual of Chemical Methods for Pesticides and Devices, U.S.EPA Office of Pesticide Programs, Published by The Association of Official Analytical Chemists, July 1976.

(A5)
The top 150+ priority substances used for this manual (and their numbers).

Acetic Acid	1	Ammonium Sulphate	16
Acetic Anhydride	2	Arsenic/Arsine	17
Acetone	3	Barium/Barium Sulfate	18
Acetylene	4	Benzene	19
Acrylonitrile	5	Benzoic Acid	20
Adipic Acid	6	Boron	21
Aluminum	7	Borax	22
Aluminum Chloride	8	Boric Acid/1,3-Butadiene	23
Aluminum Hydroxide	9	Butanols	24
Aluminum Sulfate	10	Butylene	25
Aminocarb Pesticides	11	Butyraldehydes	26
Ammonia	12	Calcium	27
Ammonium Chloride	13	Calcium compounds	28
Ammonium Nitrate	14	Calcium Carbide	29
Ammonium Phosphates	15	Calcium Carbonate	30

Calcium Chloride	31	Ethylene Glycol	66
Calcium Hypochlorite	32	Ethylene Oxide	67
Calcium Hydroxide/Oxide	33	2-Ethylhexanol/Fenitrothion	68
Calcium Phosphate	34	Ferric Chloride	69
Caprolactam	35	Formaldehyde	70
Carbaryl	36	Formic Acid	71
Carbofuran Pesticides	37	Fluoride	72
Carbon Dioxide	38	Fluorotrichloroethane	73
Carbon Disulfide	39	Hexane	74
Carbon Tetrachloride	40	Hydrazine	75
Chlordane	41	Hydrogen Chloride/Acid	76
Chloride	42	Hydrogen Fluoride/Acid	77
Chlorine	43	Hydrogen Peroxide	78
Chloroform	44	Hydrogen Sulfide	79
Chromates	45	Hydrogen	80
Copper	46	Iron	81
Copper Sulfate	47	Latex	83
Cresols	48	Lead	84
Cyanide	49	Lead Chromate	85
Cyclohexane	50	Lead Oxides	86
1,2 Dibromoethane	51	Magnesium	87
Dicamba	52	Magnesium Hydoxide	88
Dichlorobenzene	53	Malathion	89
Dichlorodifluoromethane	54	Maleic Anhydride	90
1,2 Dichloroethane	55	MCPA	91
Dichloromethane	56	MDI	92
Dichloromonofluoromethane	57	Mercury	93
2,4-D	58	Methanol	94
Dimethylamine	59	Methyl ethyl Ketone	95
Dimethyl ether	60	Methyl isobutyl Ketone	96
Dimethyl Terephthalate	61	Methyl Methacrylate	97
Dinoseb	62	Methylamine	98
Ethanol/Ethanolamine	63	Morpholine	99
Ethylbenzene	64	Naptha	100
Ethylene	65	Nitrate/Natural Gas	101

Nitric Acid	102
Nitrilotriacetic Acid	103
Nitroglycerine	104
Nonyl Phenol	105
Pentachlorophenol	106
Pentaerythritol	107
Phenol	108
Phosphate/Phosphoric Acid	109
Phosphorous	110
PCB	111
Phthalic Anhydride	112
Potassium	113
Potassium Chloride	114
Potassium Hydroxide	115
Potassium Sulfate	116
iso-Propanol/-Propylbenzene	117
Propylene	118
Propylene Glycols	119
Propylene Oxide	120
Sodium	121
Sodium Aluminate	122
Sodium Arsenite	123
Sodium Borohydride	124
Sodium Carbonate	125
Sodium Chlorate	126
Sodium Chloride	127
Sodium Cyanide	128
Sodium Dichoroisocyanurate	129
Sodium Dichromate	130
Sodium Hydrosulfite	131
Sodium Hydroxide	132
Sodium Hypochlorite	133
Sodium Phosphates	134
Sodium Silicates	135
Sodium Sulfate	136
Sodium Sulfite	137
Sulfate/Styrene	138
Sulfide	139
Sulfur	140
Sulfur Dioxide	141
Sulfuric Acid	142
Sulfuryl Chloride	143
Terepthalic Acid	144
Terphenyls	145
Tetrachloroethylene	146
Tetraethyllead	147
Titanium Dioxide	148
Toluene	149
2,4-Toluene Diisocyanate/ Triallate Pesticides	150
1,1,1-Trichloroethane	151
Trichlorfon Pesticides	152
Trifuralin Pesticides	153
Trinitrotoluene	154
Turpentine	155
Urea	156
Vinyl Acetate	157
Vinyl Cloride	158
Xylenes	159
Yellow Cake	160
Zinc	161
Zinc Chloride	162
Zinc Oxide	163
Zinc Sulfate	164

(A6)
Explanation of Abbreviations:

CV - Coefficient of Variation

CV_T - Coeffi cient of Variation (Total)

SD - Standard Deviation

RSD - Relative Standard Deviation

MDQ - Minimun Detectable Quantity